# ETIVE ECOLOGY Ltd

## Cefn Farm, Wrexham

## Proposed Solar Park

## Ecological Impact Assessment

Produced for:

corylus Planning & Environmental Ltd.

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**Quality Assessment Record**

| Report Version | Written by | Date | Reviewed by | Date |
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# 1 INTRODUCTION

## 1.1 The Scheme

1.1.1. Etive Ecology was commissioned by Corylus Planning and Environmental Ltd to undertake an Ecological Impact Assessment (EcIA) for a proposed solar park on land off Cefn Road, Wrexham. The application site is centred on National Grid Reference SJ 3682 4863.

1.1.2. This EcIA presents the findings of ecological surveys carried out on site and assesses the anticipated ecological effects of the proposed solar development. The proposed scheme is described in detail within the full planning submission but is illustrated by the Proposed Development Layout within **Appendix A**.

1.1.3. The Environmental Impact Assessment has been carried out in line with Schedule 4 of the Town and Country Planning (EIA) Regulation 2017 (HMSO 2017). The Ecological Impact Assessment (EcIA) has been carried out in accordance with the methodology provided by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

## 1.2 Report Structure

1.2.1. The Report will follow the structure below:

- Section 1.4 – Legislative and Policy context; a review of all the key planning policies and legislation relevant to the proposed development.
- Section 2 – Methodology and Methods of Assessment; a description of the basis for the survey techniques used and of how the desk study, surveys and impact assessment has been undertaken, clarifying criteria, where appropriate.
- Section 3 – Baseline Conditions and Evaluation; details of the desk study findings, and field survey data, against which the assessment is undertaken. Evaluation of the existing ecological receptors present on Site and in the Zone of Influence (ZoI) against the criteria set out in Section 3.
- Section 4 – Assessment of Effects and Mitigation; details the likely impacts of the scheme prior to any mitigation measures, assesses the effects of these impacts on ecological receptors and details the subsequent mitigation measures.
- Section 5 – Residual and Cumulative Effects; summary of residual effects and details of any cumulative effects with other relevant developments.
- Section 6 – Compensation, Enhancement and Monitoring; identifies the need for compensatory measures to address residual/cumulative effects, details enhancement measures and any monitoring.
- Section 7 – Conclusion; a summary of the significant effects and how these relate to policy and legislation, as applicable.

## 1.3 Terminology

1.3.1. For the avoidance of any confusion, the terms used in this report follow the definitions given in Table 1.3.1 below:

**Tale 1.3.1 Definitions and Terminology**

| | |
|---|---|
| **Zone of Influence** | The areas/resources that may be affected by the biophysical changes caused by activities associated with a project. (CIEEM, 2018) |
| **Impacts and Effects** | Impact' refers to an action being taken and an 'effect' is the change resulting from that action. The process of assessing effects arising from development is commonly referred to as 'impact assessment. |
| **Significant Effect** | Directive 2011/92/EU (The assessment of the effects of certain public and private projects on the environment) requires member states to assess the likely significant effects of a project (e.g. development) on the environment before determining whether consent should be given. This requirement has been transposed via Environmental Impact Assessment (EIA) Regulations. This assessment refers to significance (or level) of effects in the wider sense, to mean positive (beneficial) or negative (adverse) environmental effects that are important (material) considerations in the decision-making process, whether assessed as part of an EIA or otherwise.<br>This is directly related to set criteria and terminology as set out within the assessment process. Significant effects may, on balance with other considerations, be acceptable or unacceptable in overall planning terms. |
| **Ecological Feature** | A feature which could be a habitat or species that is present at the Site or surrounding area which has the potential to be significantly affected by the Proposed Development. |
| **Ecological Value** | The (non-monetary) value of an ecological receptor in terms of its value in its own right, based on certain criteria detailed in Section 2. (CIEEM, 2018) |

1.3.2. For the purpose of this assessment, the land within the red-line application boundary will be referred to as '**The Site**'. This is shown on Figure 1, **Appendix A**.

1.3.3. The Site is centred on National Grid Reference SJ 3682 4863. Surrounding the site are the following identifiable areas:

- Mixed use agricultural land to the north and west of the Site.
- Industrial units and scrub located on the east of the Site
- Wrexham Industrial Area to the northeast of the Site.
- Five Fords Wastewater Treatment Works located to the south of the Site.

1.3.4. The '**Proposed Development**' on which this EcIA is based comprises both the installation and the subsequent operation of a new solar park for an anticipated 40 years.

## 1.4 Legislative Context

1.4.1. This section summarises the main relevant legislation relating to ecological aspects to be considered at the Site.

### International Legislation

1.4.2. Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ('the Habitats Directive') and Council Directive 2009/147/EC on the Conservation of Wild Birds ('the Birds Directive') provide protection to flora and fauna which are considered to be of European importance, as well as providing protection to the habitats which support them through establishing a network of protected sites (the Natura 2000 network) such as Special Areas for Conservation (SACs) or Special Protection Areas (SPAs).

1.4.3. Article 6 of EU Habitats Directive on the conservation of natural habitats and of wild fauna and flora (Council Directive 92/43/EEC) states:

*"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives… competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the public".*

1.4.4. The EU Regulation 1143/2014 on invasive alien species entered into force on 1 January 2015. This Regulation seeks to address the problem of invasive alien species in a comprehensive manner so as to protect native biodiversity and ecosystem services, as well as to minimize and mitigate the human health or economic impacts that these species can have.

1.4.5. The Regulation foresees three types of interventions: prevention, early detection and rapid eradication, and management. A list of invasive alien species of Union concern will be drawn up and managed with Member States using risk assessments and scientific evidence.

### National Legislation

The Conservation of Habitats and Species Regulations 2010 ('the Habitat Regulations')

1.4.6. This piece of legislation transposes, into law (for England and Wales), the Habitats and Birds Directives. The Habitat Regulations protect numerous wild plants and animals (as well as the habitats which support them) from activities such as destruction, disturbance, killing, collection (for private use or sale) and several other activities. It also sets out measures to control operations which could potentially damage the Natura 2000 network.

1.4.7. Regulations 102 to 105 require planning authorities to assess the potential effects of plans on European Sites. Habitats Regulations Assessment ('HRA') is the process by which the requirements of the Habitats Directive are implemented and ensures that plans or projects will not adversely affect European Sites.

1.4.8. The HRA process followed is largely based on the process set out in The Habitats Regulations Assessment of Local Development Documents, David Tyldesley and Associates for Natural England - final draft (2009), another David Tyldesley paper, Habitats Regulations Assessment of Plans, categorising the potential effects of a plan and guidance from Scottish Natural Heritage, Habitats Regulations Appraisal of Plans (2012).

1.4.9. Reference in this report to 'European sites' should be taken to include the following:

- Special Areas of Conservation (SACs) for habitats and species designated through the EU Habitats Directive;
- Special Protection Areas (SPAs) for the protection of wild birds and their habitats
- designated through the EU Birds Directive;
- Ramsar sites, identified through the Convention on Wetlands of International Importance (Internationally important wetlands are designated under the Ramsar Convention 1971. UK Government policy states that the Ramsar sites and potential SPAs are afforded the same protection as SPAs and SACs for the purpose of considering development proposals that may affect them).
- Sites that are being considered for designation referred to as Sites of Community Interest, candidate SACs or proposed SPAs.

The Environment (Wales) Act 2016

1.4.10. Section 7 of the Act replaced the 'Biodiversity duty' in Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006, which requires all public bodies to have regard to biodiversity conservation when carrying out their functions. This is commonly referred to as the 'Biodiversity duty'.

1.4.11. The Section 7 list is now used to identify those habitats and species of Principal Importance in Wales under the Environment (Wales) Act.

The Countryside and Rights of Way (CRoW) Act 2000

1.4.12. The Countryside and Rights of Way (CRoW) Act amended the WCA by increasing the maximum penalty from a fine to imprisonment, as well as adding 'reckless' acts to offences as opposed to solely 'intentional' acts.

1.4.13. Schedule 12 of the Act amends the species provisions of the Wildlife and Countryside Act 1981, strengthening the legal protection for threatened species. The provisions make certain offences 'arrestable', create a new offence of reckless disturbance, confer greater powers to police and wildlife inspectors for entering premises and obtaining wildlife tissue samples for DNA analysis, and enable heavier penalties on conviction of wildlife offences.

The Protection of Badgers Act 1992

1.4.14. This act sets out offences relating to badgers, these offences involve taking, injuring or killing badgers, cruelty, interfering with badger setts and other offences.

The Wildlife and Countryside Act (WCA) 1981

1.4.15. The WCA consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 2009/147/EC (2009) EEC on the conservation of wild birds (Birds Directive). It also sets out the protection of UK designated sites such as Sites of Species Scientific Interest (SSSIs).

1.4.16. The WCA also lists additional flora and fauna that are not protected under The Conservation of Habitats and Species Regulations 2010, but are afforded protection under the WCA.

### Designated Sites

1.4.17. Designated Sites are areas that are considered to be of high value for nature conservation on a defined scale (e.g. national, local, etc.). These areas have been protected to varying extents by international conventions or local planning authority controls. Generally, the priority for the protection of designated sites is as follows:

- International/European/national sites, e.g. SACs/SSSIs/Local Nature Reserves.
- Regional or local sites, e.g. Sites of Importance for Nature Conservation (SINCs).
- Other wildlife sites, e.g. Wildlife Trust reserves.

# 2 METHODOLOGY AND METHODS OF ASSESSMENT

## 2.1 Background

2.1.1. This assessment has been undertaken in accordance with The Guidelines for Ecological Impact Assessment in the United Kingdom, published September 2018 by CIEEM.

2.1.2. The assessment process aims to:

- Provide a clear and understandable assessment of the potential significant ecological effect(s) of the Proposed Development for stakeholders;
- Determine the potential impact(s) of the Proposed Development in relation to: International, national, regional and local nature conservation and biodiversity policies; and
- Outline the processes the Proposed Development must undertake, in relation to designated sites and controlled species, in order to comply with legal requirements.

2.1.3. The main sources of information for this assessment are:

- Biological Records (obtained from the relevant Local Biological Records Centre and via freely available online sources);
- Review of previously ecological studies/reports relating to the site and surrounding land;
- Review of legislation and land-use policies;
- Consultation with other organisations as part of the EIA Scoping process (e.g. Natural Resources Wales); and
- Field Surveys.

## 2.2 Zone of Influence

2.2.1. The potential impact of a development is not always limited to the boundaries of the Site concerned. The development may also have the potential to impact on ecologically valuable sites, habitats or species beyond the Site boundaries. The area over which a development may impact ecologically valuable receptors is known as the Zone of Influence (ZoI).

2.2.2. The ZoI is determined by the source/type of impact, a potential pathway for that impact and the location and sensitivity of the ecologically valuable receptor beyond the boundary. For the majority of (unmitigated) impacts identified as part of the Proposed Development, the ZoI is generally considered to be the application site and immediately adjacent areas.

2.2.3. In ecological terms, the ZoI can also vary considerably depending upon the species potentially affected by the Proposed Development. For example, some species may be confined to a specific location whilst others, such as birds and bats are more mobile and can occupy larger territories or home ranges. The ZoI is likely to be influenced by the presence of dispersal barriers, such as roads and hardstanding, which either stop or reduce the likelihood of animals crossing it. As a consequence, this could isolate areas potentially suitable habitat within the application site due to fragmentation.

2.2.4. The ZoI for species or species groups has been determined by research and the professional judgement of the ecologist. For example common lizards (*Zootoca vivipara*) have restricted

mobility and generally occupy smaller home ranges (up to 700m ²) (Langton and Beckett, 1995).

## 2.3 Baseline Conditions

2.3.1. Using a combination of desk study and field survey work the 'Baseline Conditions' of the Proposed Development have been established. This provides a transparent basis from which assessment results have been determined and against which professional judgements have been made.

2.3.2. During the field surveys, the flora, fauna and other notable ecological features of the Site were recorded, in accordance with published good practice guidance.

2.3.3. As recommended in the Ecological Assessment guidelines (CIEEM, 2018) the value of features, habitats and species (flora and fauna), both within and surrounding the Proposed Development, will be considered from International to Site Value.

## 2.4 Desk Study

2.4.1. Prior to the field surveys, a desktop data-gathering exercise was undertaken using available online resources such as the MAGIC website (DEFRA, 2022) as well as information obtained from the local biological records centre and from relevant ecological reports for recent nearby developments.

2.4.2. The desk study was undertaken to search for statutory and non-statutory designated sites within the following ranges of the red line boundary:

- 10km for sites of International/European nature conservation importance, which comprise: Special Areas of Conservation (SAC); Special Protection Areas (SPA); and Ramsar sites, as well as all sites proposed for designation as such (candidate sites).
- 2km for sites of national nature conservation importance, which comprise: Sites of Special Scientific Interest (SSSI); and National Nature Reserves (NNR);
- 1km for other statutory and non-statutory designated sites of nature conservation importance, comprising: Local Nature Reserves (LNR); Local Wildlife Sites (LWS); Conservation Target Areas (CTA); and 'Other Sites' of conservation interest but which have no statutory or non-statutory protection.
- 250m for Habitats of Principal Importance (HPI) and Ancient Woodland.

2.4.3. Using a combination of aerial imagery (Google Earth) and OS mapping, the Site and 500m outside of the Site boundary was investigated for any presence of ponds, or other water bodies, which may be suitable for Great Crested Newts and connected to the Site by suitable habitat.

## 2.5 Field Surveys

2.5.1. An Extended Phase 1 Habitat Survey has been undertaken at the Site. The survey method follows the habitat assessment and classification procedure outlined by the Handbook for Phase 1 Habitat Survey (JNCC, 2010), whereby all habitats are identified, described and mapped using a standard classification. The survey was undertaken by Russell Grey (MCIEEM, CEnv, BSc) and Wendy O'Neill (BSc) of Etive Ecology Ltd, on 15th November 2021.

2.5.2. The extended component of the survey is developed from the methodology described in Guidelines for Baseline Ecological Assessment (IEA, 1995). All habitats and features within the survey area are assessed for their potential to support legally protected or notable species (nationally or locally). These species include:

- **Amphibians**: ponds within 250m of the site were considered for their suitability to support a range of amphibians, including great crested newts (GCN).
- **Badgers**: all habitats within 30m of the site were surveyed where possible to identify the presence of any setts or signs of badger activity.
- **Bats**: all trees on site were assessed as to their suitability to support roosting bats at any point during the year. Trees were then categorised for their potential to support roosting bats as per the *Bat Surveys for Professional Ecologists – Good Practice Guidelines* (Collins, J., 2016).
- **Birds**: the site was assessed for suitable habitats for nesting birds, including habitats suitable for ground-nesting species.
- **Otters**: watercourses within 100m of the site were checked for signs of otter and assessed for their suitability to support the species.
- **Water voles**: watercourses on site were checked for signs of water vole presence and assessed for their potential to support the species.
- **Reptiles**: the site was assessed for suitable habitats including rough grassland, previously disturbed ground and habitat edges in general which would provide cover, basking and foraging habitat for reptile species.
- **Invasive plant species**: the habitat survey does not constitute a full Schedule 9 species survey. However, the potential for any Schedule 9 species was assessed and any species that were encountered were mapped and noted.

## 2.6 GCN Habitat Suitability Index (HSI) Assessment

2.6.1 A total of eight potentially suitable water bodies (all ponds) were identified within the Study Area (see Plate 3.2.1) and were assessed for their potential to support great crested newt using the Habitat Suitability Index (HSI) in accordance with standard methodology (Oldham et al., 2000). The assessments were undertaken during June 2020. The HSI assessment considers the following ten habitat attributes that are considered to influence the suitability of a pond for breeding great crested newts:

1. Location – within a UK-wide context reflecting the differences in national distribution of this species;
2. Area – water bodies between 100 and 300 $m^2$ in size are considered to represent the most suitable habitat for great crested newt;
3. Permanence – the number of years in which a pond dries over a ten-year period. Occasional drying kills fish which is beneficial for great crested newt, but the species predominantly favours ponds that do not dry out every year.
4. Water Quality – qualitative evidence-based assessment to infer good (diverse aquatic invertebrate assemblage), moderate (moderate invertebrate diversity), poor (low invertebrate diversity, few submerged plants) or bad (clearly polluted) water quality.
5. Shade – percentage of pond perimeter shaded to at least 1 m from the shore. Great crested newt favours lightly shaded water bodies;

6. Waterfowl – qualitative evidence-based assessment of presence or absence and numbers is made. Large numbers of waterfowl can result in nutrient enrichment of the water and habitat damage, which is less favourable for great crested newt;
7. Fish – qualitative evidence-based assessment of likely presence or absence is made. Great crested newt favour breeding ponds that do not support fish because their open-water swimming larvae are vulnerable to fish predation;
8. Other Ponds – great crested newt populations are typically best developed where they have access to a network of ponds, and therefore the species is more likely to be found where there are several ponds within 1 km that are linked by suitable terrestrial habitat; and
9. Terrestrial Habitat – quality, suitability and availability of terrestrial habitat for GCN.
10. Macrophytes – percentage of pond surface area occupied by macrophyte cover. Female great crested newts require aquatic vegetation for egg-laying.

## 2.7 eDNA Survey

2.7.1 Water samples were collected by Etive Ecology Limited from all suitable ponds within the Study Area on the 28th June 2020. Samples were sent to SureScreen Scientifics for eDNA analysis in accordance with the protocol stated in DEFRA WC1067[1]. Water bodies were not entered by surveyors during sample collection, and sterile equipment supplied by SureScreen Scientifics/FERA was used to collect each water sample to prevent contamination between samples. If eDNA is detected this provides confirmation of GCN presence and the relevant water bodies are likely to represent a development constraint that requires further consideration. If eDNA is not detected then this provides high confidence that there is no reasonable likelihood of great crested newt being present in the relevant water bodies.

## 2.8 Birds

2.8.1 The Common Bird Census (CBC) survey methodology was followed and consisted of the surveyor traversing the Site on foot. The survey area extended up to the site boundaries. All birds encountered on site were recorded using field maps and using standard British Trust for Ornithology (BTO) species and activity codes. Birds were categorised as per the Birds of Conservation Concern (BoCC) list.

2.8.2 The Site was visited on three occasions to identify the presence and status of breeding birds. Surveys were undertaken paying due regard to guidance provided in the Breeding Bird Survey (BBS) methodology. All parts of the Site were visited on foot to within 50m where visibility extended or closer where visibility was needed for example in woodlands or behind hedgerows. Surveys were carried out on days with little or no wind, rain or mist in order to maximise the potential for detection of birds and to avoid the possibility of bird activity being suppressed by inclement weather conditions. Surveys were undertaken by a competent and experienced bird surveyor (Russell Grey). Survey dates, personnel and weather conditions are shown in Table 3.2.4.

2.8.3 Species were identified by sight or sound and details of behaviour and activity was recorded. Binoculars were used as required and to minimise disturbance to potentially breeding species. A species list of common passerine birds was compiled for the site; details of activity and

[1] Biggs et al (2014) *Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA*. Freshwater Habitats Trust, Oxford.

behaviour were made. The results were analysed to assess the status of the birds on site as one of the following:

- Non-breeding – Flyover or species observed within unsuitable breeding habitat;
- Possible breeding – Species observed in breeding season in suitable nesting habitat;
- Probable breeding – Pair observed in suitable nesting habitat in breeding season, territorial behaviour observed on at least two occasions, courtship and display observed, observed visiting probable nest site, agitated behaviour or anxiety calls from adults or nest building observed; or
- Confirmed breeding – Used nest or eggshells, distraction display/injury feigning observed, recently fledged young, adults on nest, adult carrying faecal sac or food, nest containing eggs or nest with young seen/heard.

## 2.9 Limitations to the Baseline

2.9.1 The initial Phase 1 Habitat survey was undertaken within the recommended survey season. The second survey was undertaken outside the recommended survey season. Since the surveys overlap seasons, it was possible to identify the majority of species of flora present and given the current land use and management of the Site no notable species are considered likely to be present.

2.9.2 Access was permitted to all land within the proposed development footprint. Access beyond the Site boundary was restricted but much of the adjacent land was at least visible to the surveyor.

2.9.3 There are considered to be no significant limitations to the undertaking or accuracy of the survey work or subsequent ecological appraisal.

## 2.10 Evaluation Methodology

2.10.1 The importance of the existing habitats at the Site was evaluated following established principles as set out by CIEEM 2019 In assessing the importance of an ecological feature, consideration has been given to the criteria adapted from Ratcliffe (1977), namely naturalness, size, rarity, diversity and fragility as well as position within the ecological unit, potential value and intrinsic appeal. All species and populations of species, including those with statutory protection, are evaluated on the same basis. An example of this would be a small population of a protected species at the Site, where the species is widespread, will not rank highly. Table 2.10.1 details the Criteria for Evaluation.

**Table 2.10.1 Criteria for Evaluation**

| Scale | Species | Habitat |
|---|---|---|
| International | A regularly occurring population of an internationally important species, which is threatened or rare in the UK, where the population is a critical part of a wider population or where a species is at a critical phase in its life cycle at this scale. | An internationally designated Site, i.e. SAC, SPA, Ramsar, or one proposed for designation.<br>Sites supporting areas of priority habitats which are scarce at an international level or where it is needed to maintain the viability of a larger area at that level. |
| National | A regularly occurring population/number of a nationally important species which is threatened or rare, where the population is a critical part of a wider population or where a species is at a critical phase in its life cycle at this scale. A regularly occurring population of a nationally important species on the edge of its natural range. A species assemblage of national significance. | A nationally designated Site, i.e. SSSI or one that meets the published criteria.<br>Sites supporting areas of priority habitats which are scarce at a national level or where it is needed to maintain the viability of a larger area at that level. |
| Regional | A regularly occurring, locally significant population of a species listed as being nationally scarce. A regularly occurring, locally significant number of a regionally important species or where the population is a critical part of a wider population or where a species is at a critical phase in its life cycle at this scale.<br>A species assemblage of regional significance. | Sites supporting a viable area of a priority habitat which is scarce at a regional level or where it is needed to maintain the viability of a larger area at that level. |
| County / District | Any regularly occurring, locally significant population of a species which is listed in a county/district Red Data Book or BAP on account of its rarity.<br>A regularly occurring, locally significant number of a county/district important species or where the population is a critical part of a wider population or where a species is at a critical phase in its life cycle at this scale.<br>A species assemblage of county/district significance. | A County designated Site or one that meets published criteria.<br>Sites supporting a viable area of a priority habitat which is scarce at a county level or where it is needed to maintain the viability of a larger area.<br>Local Nature Reserves, Local Wildlife Sites/potential Local Wildlife Sites.<br>Sites/features that is scarce within the district.<br>Areas of Semi Natural Ancient Woodland. |
| Local | Populations or species assemblages considered to enhance the local ecological resource, e.g. a breeding bird assemblage. | Areas of habitat considered enriching appreciably the habitat resource within the context of the locality or which buffer those of a more important nature. |
| Site | Populations or species assemblages insufficient to be considered in the wider context. | Habitats or areas of habitat insufficient to be considered in the wider context. |

## 2.11 Ecological Impact Assessment Methodology

2.11.1. In line with recognised assessment guidance (CIEEM, 2018), the ecological impacts and effects are assessed using surveys and research to identify ecological receptors which will be affected as a result of the Proposed Development as follows:

- Determine the severity of the impact and effect without specific mitigation measures;
- Outline a potential mitigation strategy which would be implemented to avoid or reduce undesirable impacts and effects;
- Assess the likelihood that the mitigation strategy will be successful;
- Establish areas of potential environmental improvement; and
- Assess the Significance of the residual impact of the Proposed Development, assuming the mitigation strategy has been fully implemented and that suggested areas of potential environmental improvement have been acted upon.

## 2.12 Classifying Impacts and Effects

2.12.1. It is important that, when describing and classifying potential impacts and effects, this is done in an unambiguous manner. Impacts (i.e. changes) need to be understood to then determine the likely effect (consequence) of that impact in relation to the ecological receptor. The criteria used to describe the certainty, or confidence, of whether an impact or effect will occur ('likelihood') is given in Table 2.12.1.

**Table 2.12.1 Classification of Likelihood**

| Classification | Criteria |
|---|---|
| Certain / Near-Certain | Probability is estimated as 95% or higher. |
| Probable | Probability is estimated as >50% but <95%. |
| Unlikely | Probability is estimated as >5% but <50%. |
| Extremely Unlikely | Probability is estimated as <5%. |

2.12.2. A description of parameters that are considered when assessing the degree and type of change are provided in Table 2.12.2. Criteria to assess, on a scale of Low to High, the degree and type of change are provided in Table 2.12.3, and an overall level of effect determined. In conjunction with consideration of the evaluation of the ecological receptor, an assessment of the Significance of the residual effect (for the type/nature of change), is provided in accordance with the criteria in Table 2.12.4 and described together with an indication of likelihood.

**Table 2.12.2 Impact/Effect Parameters**

| Parameters | Definition |
|---|---|
| **Nature of Change** | 'Direction' of change. **Positive** changes are given equal merit to **Negative** changes in relation to the overall biodiversity outcome. No overall change would be **Neutral**. |
| **Magnitude** | The 'size', 'scale' or 'amount' of change, determined on a quantitative basis where possible. Includes consideration of:<br>The **geographical extent** (area) over which change occurs.<br>The **Duration** of time over which the assessed change is expected to last. This is based on ecological characteristics not human timeframes and may be **Temporary, Short Term, Medium Term** or **Long-Term**.<br>The **Frequency** of a Negative impact must also be considered; A single impact may have no effect but a number of repeating same impacts may create a Negative effect. |
| **Reversibility** | **Irreversible** changes are negative changes from which recovery is not possible within a reasonable timescale or for which there is no reasonable change of action being taken to reverse it.<br>**Reversible** changes are negative changes from which spontaneous recovery is possible or for which effective mitigation is both possible and an enforceable commitment is proffered. |
| **Timing** | **Timing** of a Negative impact may be important in understanding the effect of that impact, e.g. if it coincides with critical life-stages or seasons. |

**Table 2.12.3 Classification of Impact/Effect Parameters**

| Parameter | Degree of Impact Aspect | | |
|---|---|---|---|
| | LOW | MEDIUM | HIGH |
| Magnitude | Minimal Change | < ------- > | Substantial Change |
| Extent | Limited / Small Area | < ------- > | Widespread Change |
| Duration | <18 months (Temporary) | < ------- > | >8 years (Long-term) |
| Frequency | Single or seldom occurring event | < ------- > | Numerous, regular occurring events |
| Timing | Non-Critical Timing | < ------- > | Critical Timing |

**Table 2.12.4 Classification of Significance and Nature of Effect**

| Classification | Criteria |
|---|---|
| Negative (Significant) | Likely to create a Significant negative effect, including loss, or long-term or irreversible damage on the integrity / status of a valued ecological receptor. |
| Negative (Not Significant) | Likely to create a negative effect without causing long-term or irreversible damage to the integrity / status of an ecological receptor |
| Neutral (Not Significant) | Effects are either absent or such that no overall net change to the ecological receptor occurs. |

| Classification | Criteria |
|---|---|
| Positive (Not Significant) | Likely to create a beneficial effect on an ecological receptor, or providing a new (lower value) ecological feature, without improving its conservation status markedly. |
| Positive (Significant) | Activity is likely to create a Significant beneficial effect, including long-term enhancement and favourable condition of an existing valued ecological receptor, or creation of a new valued ecological feature. |

# 3 BASELINE CONDITIONS AND EVALUATION

## 3.1 Desk Study

3.1.1 There are no statutory designated nature conservation sites within 2km of the Site:

3.1.2 The following non-statutory designated nature conservation sites were identified within 1km of the site:

**Table 3.1.1 Non-Statutory Designated Sites**

| Site Name | Designation | Description and Value | Distance from Site |
|---|---|---|---|
| Marchwiel Marsh | Local Wildlife Site (LWS) | Marshy field between school and disused railway line. Past improvement has led to it being dominated by rushes; hard rush, soft rush and jointed rush are all abundant. Grasses are also prevalent with timothy and Yorkshire fog the most common. Herbs are represented in the main by creeping buttercup and great willowherb, but other species present include black knapweed, hairy sedge, bog stitchwort and meadowsweet. **County Value** | 790m southwest |
| Cefn Park | LWS | This Site is a series of broadleaved woodlands within Cefn Park Estate. Big Wood is the largest (8.9ha) and is dominated by ash with oak, sycamore and an occasional mature wych elm. The understorey is continuous with frequent holly, young sycamore and wych elm. Part of the wood has been underplanted with conifers but which are not thriving. There is a rich ground flora which includes dog's mercury, bluebell, wood anenome and ramsons. Rhododendron Spinney is also dominated by ash but with beech and sweet chestnut and a locally dense understorey of rhododendron. Alder,crack and goat willows dominate the poorly drained eastern side where great horsetail and greater pond sedge occur as well as a fen dominated by common reed. ( Further surveys are required for Redwither Wood and Clays Plantation.) Fen, Semi-natural broad-leaved woodland. **County Value** | 918m northwest |

3.1.3. The following ancient woodland sites were identified within 250m of the site.

**Table 3.1.4 Ancient Woodland Sites**

| Site Name | Type | Description | Distance from Site |
|---|---|---|---|
| 33400 | AW | An ancient semi natural woodland **County Value** | 61m west |
| 30636 | AW | A restored ancient woodland **County Value** | 71m west |
| 33397 | AW | An ancient semi natural woodland **County Value** | 91m west |

### Species Records

3.1.4 Full details of the data provided by Cofnod are given in **Appendix C**. Below is a summary of the key records by species group as provided by Cofnod:

- Amphibians; GCN, palmate newt, smooth newt, and common frog.
- Badgers; Badger was recorded [redacted]
- Bats; Lesser horseshoe, brown long-eared, common pipistrelle, soprano pipistrelle, noctule, whiskered, Daubenton's, Brandt's.
- Birds; numerous bird species including notable species such as; cuckoo kingfisher, skylark, willow tit, Cetti's warbler, barn owl, peregrine.
- Invertebrates; dingy skipper, small heath, white-letter hairstreak and wall.
- Riparian Mammals; hare, hedgehog, otter, weasel, and polecat.
- Reptiles; common lizard, adder and grass snake.
- Notable Species: hare, hedgehog, weasel, and polecat.

### Environment (Wales) Act 2016

3.1.5 Section 7 of the Act replaced the 'Biodiversity duty' in Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006, which requires all public bodies to have regard to biodiversity conservation when carrying out their functions. This is commonly referred to as the 'Biodiversity duty'.

3.1.6 The Section 7 list is now used to identify those habitats and species of Principal Importance in Wales under the Environment (Wales) Act. The following relevant habitats and species are found on this list:

**Table 3.1.1 Relevant Section 7 Habitats/Species**

| Habitats | Species |
|---|---|
| Hedgerows | Hedgehog |
| Arable field margins | Brown hare |
| Lowland meadow | Polecat |
| Ponds | Slow worm |
| | Great crested newt |
| | Various invertebrate species |
| | Various bird species |
| | Various bat species |

## 3.2 Extended Phase 1 Habitat Survey

### Habitats

3.2.1 An extended Phase 1 Habitat Survey of the Site and adjacent land was carried out in November 2021 by Etive Ecology Ltd. The Phase 1 Habitat Map is shown as Figure 2 in **Appendix A** of this EcIA.

3.2.2 The Site was found to comprise the following habitats:

- Arable
- Species-poor native hedgerow with trees
- Species-poor native hedgerow
- Dry ditch
- Fence
- Tall ruderal
- Scattered broadleaved trees

3.2.3 The Proposed Development is accessed off Cefn Road to the south of the site via a gate located within a recently managed native species-poor hedgerow (Photograph 1). The Proposed Development covers an area ~13.3ha in size and is dominated by arable fields and hedgerows. One large field is divided into two 'Compartments' by a managed native species-poor hedgerow with trees which runs in a north to south direction, along which there is a slow flowing, seasonally dry ditch.

3.2.4 **Compartment 1** on the west of the site has a ditch adjacent to the shared hedgerow which runs concurrently along the east and northeast boundaries. The steeply sloping vegetated sides of the ditch comprise species such as, dock, creeping buttercup, bitterdock, cow parsnip, and stinging nettle. On the northeast boundary the hedgerow is dominated by blackthorn, with abundant hawthorn, occasional ash and willow, rare holly, and frequent honeysuckle and is ~6m tall and 0.75m deep. As the hedgerow progresses to the west it becomes a defunct hedgerow (Photograph 2) with two ivy clad oak trees (T1, T2) and ash saplings forming a boundary against a barbed wire fence and a limited field margin of tall ruderals, false oat grass and occasional ragwort. Beyond this fence and adjacent to the site there is an area of scrub and semi-improved grassland. A mature pedunculate oak (T3) is located within the hedgerow near to the west corner. The hedgerow creating a boundary with Cefn Road on the southwest on the site is managed and species poor. In the centre Compartment 1 there is a single semi-mature oak tree.

3.2.5 The east boundary of **Compartment 2** begins with a defunct hedgerow and a narrow field margin comprising tall ruderals such as stinging nettle, cow parsnip and willow herb growing within a barbed wire fence structure which continues part way across the north boundary. Scattered semi-mature broadleaved trees of which some are ivy clad, are located along the length of the east and north boundary (T4, T5). A metal fence is located ~ 3m (Photograph 3) from the barbed wire fence with which it runs concurrently for ~120m and demarcates the adjacent landownership on which two factory units are located. This 'off-site' area comprises unmanaged semi-improved grassland and amenity grassland. At the north corner of the site a species poor hedgerow comprising hawthorn, oak, frequent ash, sycamore, and field maple begins.

3.2.6 Adjacent to the north of the site, outside the Site boundary, there is a dense area of sloping scrub dominant with bramble and birch and frequent with hemlock, and tall ruderal, (Photographs 4 and 5) covering an area of ~0.3ha. The barbed wire fencing ends along this boundary and an unmanaged native species-poor hedgerow with trees begins. This hedgerow is ~5m tall and 2m wide, comprising species such as privet, hawthorn, blackthorn, field maple, ash saplings and ivy clad oak trees. This hedgerow has a narrow, ungraded field margin of false oatgrass, Yorkshire fog, ribwort plantain, stinging nettle and creeping thistle. As the hedgerow progresses toward the northwest it becomes ~6m tall and has a limited field margin of tall ruderals, false oat grass, occasional ragwort. A mature pedunculate oak tree ~6m (T6) is located within the hedgerow near to the west corner.

3.2.7 The hedgerow along the west of this compartment, which divides the site into two compartments, is a managed native species-poor hedgerow with trees. The species composition is dominated by hazel and blackthorn, with frequent holly and occasional field maple and honeysuckle. There are four mature ivy clad oak trees within the hedgerow of which three have bat roost potential (T7, T8, T9). The managed hedgerow continues along the west boundary past a gap providing access to Compartment 1 and then becomes a single species hedgerow, comprising field maple and eventually becoming a managed species-poor hedgerow with trees until it meets the southern boundary hedgerow along Cefn Road. In the centre of Compartment 2 there are three mature oak trees (T10, T11, T12).

3.2.8 To the south of Cefn Road, the site boundary extends to cover an existing access road into Five Fords WWTW and adjacent scrub, young scattered trees and rough grassland. At the southern end of the site boundary is a pocket of young scrub and scattered trees within an area of stock-fencing that was not accessible at the time of survey but was fully visible from outside of the fence. At the northern end of the access road, closest to Cefn Road is a pocket of rough unmanaged grassland on the edge of an arable field. To the east of the access road is another arable field. It is anticipated that the area of scrub lost to the proposed substation will be recreated in the area of rough grassland, as compensation and to ensure no net loss.

3.2.9 Land beyond the Proposed Development boundary and within 250m of the Site was found to comprise the following additional habitats:

- Scrub
- Semi-improved grassland
- Amenity grassland
- Running water
- Industrial buildings
- Broadleaved woodland
- Hardstanding

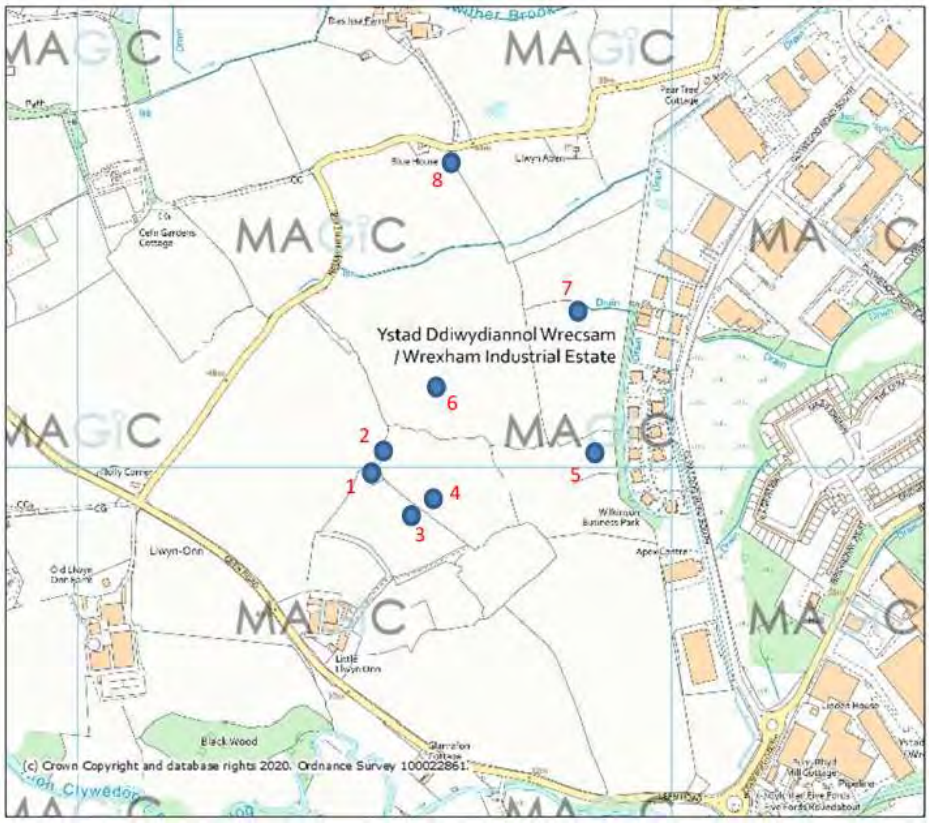
3.2.10 Land within 250m of the Site is dominated by arable fields with a network of hedgerows. To the east of the Site there are industrial buildings with areas of hardstanding, scrub and amenity grassland. In the northeast corner of the Site there is an area of sloping ground with dense scrub dominated by hawthorn species with frequent hazel, birch and blackthorn, occasional elder and rose. The ground flora was a mixture of tall ruderal, forbs and grasses and comprised abundant false oatgrass, frequent: ragwort, common nettle, creeping thistle, creeping cinque foil, Cock's-foot, Yorkshire fog. There was also occasional teasle, upright hedge parsley, prickly ox-tongue, burdock, silver weed, Timothy, cranes bill, white clover, hairy

tare, black medic and ribwort plantain. Semi-improved grassland and traditional agricultural buildings comprising brick built and corrugated metal and wood structures with areas of hardstanding are located to the northwest of the Site.

### Amphibians

3.2.11 There are no ponds located within the site boundary. There is a drainage ditch located within the site boundary, dividing Compartments 1 and 2. There are eight ponds located within land accessible to the surveyor; six of which are within 500m of the Site (Plate 3.2.1). All eight ponds were surveyed in June 2020 by NRW licensed ecologist Russell Grey (S088565/1). The eight ponds were subject to a habitat suitability survey, using HSI screening to discern the likelihood of GCN presence. Ponds achieving a score indicating potential suitability for breeding habitat were subject to further eDNA surveys also in June 2020.

**Plate 3.2.1 Ponds Accessible to Surveyor**




3.2.12 Ponds, 4, 5, 6, 7 and 8 achieved a score indicative of potential breeding suitability as shown by the HSI scores in Table 3.2.1 below. All five of these ponds were then subject to eDNA surveys. The results returned from eDNA testing were positive for Pond 7 and negative for all other ponds (Analysis results are found in **Appendix D**).

**Table 3.2.1 HSI Assessment Summary**

| Pond | Criteria | | | | | | | | | | HSI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| **1** | 1 | 0.8 | 0.5 | 0.33 | 0.2 | 0.67 | 1 | 0.95 | 0.67 | 0.4 | 0.58 |
| **2** | 1 | 0.8 | 0.5 | 0.33 | 0.2 | 0.67 | 1 | 0.95 | 0.67 | 0.4 | 0.58 |
| **3** | RECENTLY IN-FILLED | | | | | | | | | | |
| **4** | 1 | 0.6 | 0.5 | 0.67 | 1 | 0.67 | 1 | 0.95 | 0.33 | 0.8 | 0.71 |
| **5** | 1 | 0.2 | 0.5 | 0.67 | 1 | 1 | 1 | 0.95 | 0.33 | 0.9 | 0.67 |
| **6** | 1 | 0.8 | 0.9 | 0.67 | 0.8 | 0.67 | 0.33 | 0.95 | 0.33 | 0.5 | 0.65 |
| **7** | 1 | 0.8 | 0.9 | 0.67 | 0.8 | 0.67 | 0.33 | 0.95 | 0.67 | 0.5 | 0.70 |
| **8** | 1 | 0.8 | 1 | 0.33 | 0.2 | 1 | 1 | 0.95 | 0.67 | 0.3 | 0.66 |

**Table 3.2.2 Summary of Ponds**

| Pond | HSI Score | Photograph | eDNA Result |
|---|---|---|---|
| 1 | Too dry to sample, heavy shade.<br><br>0.58 |  | N/A |
| 2 | Too dry to sample, heavy shade.<br><br>0.58 |  | N/A |

| Pond | HSI Score | Photograph | eDNA Result |
|---|---|---|---|
| 3 | Recently in-filled.<br><br>N/A |  | N/A |
| 4 | Good suitability for GCN due to good water quality and aquatic vegetation.<br><br>0.71 |  | Negative |
| 5 | Moderate suitability for GCN due to good water quality and aquatic vegetation.<br><br>0.67 |  | Negative |

| Pond | HSI Score | Photograph | eDNA Result |
|---|---|---|---|
| 6 | Moderate suitability for GCN due to aquatic vegetation and pond size.<br><br>0.65 |  | Negative |
| 7 | Good suitability for GCN based on aquatic vegetation and pond size.<br><br>0.70 |  | Positive |
| 8 | Moderate suitability for GCN due to pond size and absence if fish/fowl.<br><br>0.66 |  | Negative |

3.2.13 The terrestrial habitats present within the Site boundary are considered to be of moderate value to amphibians. The majority of the Site comprises recently drilled arable land which is of low value as it lacks vegetation cover and structure. However, the Site boundaries of Compartment 2 comprise well-established hedgerows with graded field margins which create wide corridors of high value to amphibians during their terrestrial phase as they offer shelter

and protection. The field margins in Compartment 1 were narrow and ungraded and did not offer the same level of suitability. Therefore, the boundaries of the Site are suitable to support GCN and any other amphibian species.

3.2.14 Cofnod returned 800 records for GCN within 2km of the Site, of which the closest records are located 119m, 131m, 162m and 190m, to the north of the Site ranging from 2007 – 2010. There is an abundance of records for GCN located to the east of the Site within Wrexham Industrial Estate from 2016 – 2019 and also to the south and southwest of the Site, within Five Fords WWTW where the closest record is 569m from 2002. There are fewer records of Palmate newt, the closest record was 685m to the east of the Site in 2019 and smooth newt were recorded 498m to the southeast of the Site in 2017, within deciduous woodland. The closest common frog and toad were recorded 514m to the east of the Site in 2019. In summary, there are high numbers of amphibians recorded locally, including GCN located near to the Site, in well-connected habitat. However, there are numerous natural (flowing water-courses) and artificial (main roads) barriers to dispersal routes between those locations and the Site.

3.2.15 Based on the historical records, the HSI/eDNA findings and the suitability of terrestrial habitat on Site it is concluded that GCN and other species of amphibian are potentially present within the development footprint. Overall, the Site is considered to be of Local value to all species of amphibian.

**Badger**

3.2.16 [redacted]

3.2.17 [redacted]

3.2.18 [redacted]

**Bats**

3.2.19 There are a number of trees on Site with the potential to support roosting bats. There are four semi-mature oak trees within Compartment 1 (T1, T2, T3 and T13). There are nine semi-mature oak trees within Compartment 2, (T4 – T12). The locations of these trees are shown

on the Phase 1 Habitat Map. These trees are described in Table 3.2.3 below. There are no structures found within the red-line development boundary.

3.2.20 The Site as a whole is considered to be of moderate value as a foraging or commuting resource to bats. Although the Site comprises entirely semi-natural habitats the arable land that dominates the Site is species-poor and unlikely to support high levels insect prey. The hedgerow corridors are of much greater value and offer good foraging and commuting routes for bat and connect well the wider landscape.

**Table 3.2.3 Description of Trees with Bat Roost Potential (BRP[2])**

| Tree ID | Features | BRP |
|---|---|---|
| 1 | Dense ivy cladding | Low |
| 2 | | Low |
| 3 | Occasional small rot holes and gaps around previously cut/removed limbs. | Low |
| 4 | Dense ivy cladding and a couple of small dead limbs with gaps/holes. | Low |
| 5 | | Low |
| 6 | Mature specimen with a notable hole around previously cut/removed limb, a number of deep fissures and a callous roll feature at another lost limb. | High |
| 7 | Semi-mature specimens all covered in dense ivy cladding | Low |
| 8 | | Low |
| 9 | | Low |
| 10 | Dead limbs, rot holes and exposed cracks/splits from tear-out limbs. | Medium |
| 11 | | Medium |
| 12 | | Medium |
| 13 | Mature specimen with multiple low value features such as cracks and rot holes. | Medium |

3.2.21 There are a number of suitable foraging and commuting features found immediately adjacent to the Site, including the semi-natural broadleaved woodland to the north and to the southeast. The River Clywedog is also located to the south of the Site and there are a number of farm buildings located to the west of the Site.

3.2.22 Cofnod returned records for numerous species of bats roosting within 2km of the Site. These include Brandt's, brown long-eared, *Myotis* sp., common and soprano pipistrelle bats. The closest records are for whiskered bat 283m to the east of the site from 2004, an unknown species 513m to the east of the Site, a number of records for common pipistrelle between 489m and 989m to the southwest of the ranging between 2004 and 2017.

3.2.23 The relative abundance of bat records indicates the high value of the wider area, rather than the Site in particular. However, there is value in the network of hedgerows within the Site for foraging/commuting bats and due to the bat roost potential presented by numerous trees it

[2] **High** = trees with one or more potential roost Sites suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time. **Medium** = trees with one or more potential roost Sites that could be used by bats but unlikely to support a roost of high conservation status. **Low** = trees with one or more potential roost Sites that could be used by individual bats opportunistically, but are not suitable to be used on a regular basis by larger numbers of bats. **Negligible** = negligible features likely to be used by roosting bats (Collins, J., 2016).

is concluded that the Site is of potential value for roosting bats and moderate value for foraging and commuting bats.

### Birds

3.2.24 The Site offers high value opportunities for nesting birds within the boundary hedgerows and trees. The hedgerow corridors have the potential to support a high number of nesting birds given the length of habitat available. The main body of the site is arable land and as such is considered to be of low value to ground-nesting birds. The hedgerows and the grassland fields also offer good foraging habitat.

3.2.25 Breeding bird surveys were undertaken during April, May and June 2021. Survey times and weather conditions are noted in Table 3.2.4 below. Figures 3.1 – 3.3 (**Appendix A**) illustrate the full survey findings, which are summarised herein.

**Table 3.2.4 Survey times and weather conditions.**

| | 29th April 2021 | 20th May 2021 | 17th June 2021 |
|---|---|---|---|
| Sunrise | 05:44 | 05:05 | 04:43 |
| Start time | 06:15 | 05:35 | 05:43 |
| End time | 07:15 | 06:35 | 06:43 |
| Weather conditions | Dry, 4°C, 4mph northerly, 0% cloud | Dry, 8°C, 10mph south-easterly, 90% cloud | Dry, 10°C, 7mph southerly, 10% cloud |

3.2.26 The survey results found one confirmed nest for buzzard located in Tree 08, within the site boundary. There were 13 probable nesting species and 7 possible nesting species. There were two amber list species recorded within the Site; bullfinch (present during the first survey only) and dunnock (present on all three surveys), both are noted as Probable for breeding within the Site. There were two red list species recorded on Site, house sparrow and song thrush, both recorded on the latter two surveys and both recorded as Probable breeders on Site.

**Table 3.2.5 Results from three Breeding bird surveys.**

| Species | Conservation Status | 29th April 2021 | | 20th May 2021 | | 17th June 2021 | | Total No |
|---|---|---|---|---|---|---|---|---|
| | | Breeding Status | No Birds | Breeding Status | No Birds | Breeding Status | No Birds | |
| Blackbird | | Possible | 3 | Probable | 7 | Probable | 2 | 12 |
| Blackcap | | | | Probable | 1 | Probable | 1 | 2 |
| Blue tit | | Probable | 6 | Probable | 4 | Probable | 4 | 14 |
| Bullfinch | | Possible | 1 | | | | | 1 |
| Buzzard | | Probable | 1 | Confirmed | 2 | Confirmed | 2 | 5 |
| Carrion crow | | Possible | 1 | Possible | 8 | Possible | 6 | 15 |
| Chaffinch | | Possible | 2 | Possible | 1 | Possible | 3 | 6 |
| Chiffchaff | | Possible | 2 | Probable | 2 | Probable | 2 | 6 |
| Great tit | | Possible | 1 | Probable | 1 | Probable | 0 | 2 |
| Coal tit | | Possible | 1 | | | | | 1 |
| Dunnock | | Possible | 3 | Probable | 1 | Probable | 2 | 6 |
| Goldfinch | | | | Possible | 1 | Possible | 0 | 1 |

| Species | Conservation Status | 29th April 2021 | | 20th May 2021 | | 17th June 2021 | | Total No |
|---|---|---|---|---|---|---|---|---|
| | | Breeding Status | No Birds | Breeding Status | No Birds | Breeding Status | No Birds | |
| Greenfinch | | | | Off-Site | 1 | Off-Site | 0 | 1 |
| House martin | | | | Off-Site | 1 | Off-Site | 2 | 3 |
| House sparrow | | | | Off-Site | 2 | Off-Site | 2 | 4 |
| Jackdaw | | | | Possible | 2 | Possible | 0 | 2 |
| Long-tailed tit | | Probable | 4 | Probable | 2 | Probable | 1 | 7 |
| Magpie | | Probable | 3 | Probable | 2 | Probable | 1 | 6 |
| Pied wagtail | | Possible | 1 | Possible | 1 | Possible | 1 | 3 |
| Robin | | Possible | 2 | Probable | 4 | Probable | 5 | 11 |
| Song Thrush | | | | Probable | 2 | Probable | 1 | 3 |
| Swallow | | Possible | 3 | Off-Site | 1 | Off-Site | 1 | 5 |
| Whitethroat | | Probable | 5 | Probable | 1 | Probable | 1 | 7 |
| Woodpigeon | | Possible | 6 | Probable | 2 | Probable | 4 | 12 |
| Wren | | Possible | 9 | Probable | 5 | Probable | 5 | 19 |
| Yellowhammer | | | | Off-Site | 1 | Off-Site | 0 | 1 |

3.2.27 Records for the area surrounding the site include numerous species of conservation concern such as bullfinch, cuckoo, linnet, dunnock and yellowhammer.

3.2.28 It is concluded that an assemblage of nesting birds is present within the site boundary, deemed to be of Local/Site value.

### Reptiles

3.2.29 The arable land that forms the majority of the site does not offer suitable habitat for reptiles as it is heavily disturbed throughout the year and comprises a poor habitat structure, i.e. either bare ground or cropped. However, the field margins with their varied structure, areas of dense herbage, hedgerows, boundary banks and bramble offer potentially suitable habitat for reptiles such as common lizard or grass snake for basking, foraging and sheltering. The field margins connecting the hedgerows are not densely vegetated but do offer routes to dispersal. Therefore, there remains the potential for the presence of reptiles.

3.2.30 There is a single record of reptiles within 1km of the Site; a grass snake 813m to the south of the Site. No sign of any reptile activity was found on Site during the survey, although sightings are rare even in suitable habitat.

3.2.31 In summary it is concluded that reptiles are potentially present within the Site boundary corridors and within the immediately surrounding land.

### Riparian Mammals

3.2.32 The River Clywedog is 301m to the south of the Site and the closest pond is ~350m to the northwest of the Site. There is field ditch dividing Compartments 1 and 2 and extending along the northern boundary of Compartment 1. The terrestrial habitat within the Site boundary is of low value to riparian mammals owing to the lack of vegetation cover away from the minor

field ditches. Cefn Road is considered likely to act as a significant barrier to dispersal between the Site and the River Clywedog to the south.

3.2.33 There are records of otter returned within 2km of the Site, the closest is from 2014 located 254m to the south on the River Clywedog. Further afield there are four records of otter to the west on the River Gwenfra between 2014 and 2019 and two records to the east in the Wrexham Industrial Estate from 2019. No signs of any riparian mammals were found within the Site boundary during the walkover survey. There are no records of water vole within 1km of the Site. Therefore, both otter and water vole are considered to be absent from the Site.

3.2.34 In summary, the site is of **Negligible Value** to riparian mammals and this group of species is not considered further within this EcIA.

### Invertebrates

3.2.35 No targeted invertebrate survey was undertaken as part of the ecological appraisal of the Site. However, the Site was assessed for its invertebrate potential as part of the ecological walkover and was found to be of very low potential. This is because the Site comprises predominantly of arable land of negligible value and whilst there are vegetated boundary corridors, these are typical of boundaries found widely within the local area.

3.2.36 Local records include UK Priority Species such as the Southern iron blue to the northwest of the Site and one record of *Crangonyx pseudogracilis* within the Site boundary from 2010.

3.2.37 Overall, no significant invertebrate assemblage is considered likely to be present within the site boundary. Therefore, invertebrates are not considered further within the EcIA.

### Notable Species

3.2.38 There are records for brown hare, hedgehog, weasel and polecat within 1km of the Site, all of which are listed as species of Principal Importance under the Environment (Wales) Act 2016. The Site is considered to be potentially suitable to support all of these species but is sub-optimal given the habitat assemblage of arable land surrounded by species-poor hedgerows. Overall, the Site is considered to be of Local Value to notable species of fauna.

3.2.39 No notable or locally rare species of flora were recorded on Site during the survey effort, and given the lack of any notable land management, no such species are considered likely to be present. There are no records of any such species within 1km of the Site. Overall, the Site is considered to be of **Negligible Value** for these species and will not be considered further within the EcIA.

### Invasive Non-Native Species

3.2.40 Sporadic Himalayan balsam – an invasive non-native species (INNS) of flora listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) – was identified within the southern site boundary during the initial site survey in August 2021. In November 2021, during a second site walkover Himalayan balsam was recorded 20m to the south of the Site within the wooded area adjacent to Cefn Road and the River Clywedog.

3.2.41 There is a record of Japanese knotweed from 2012 located 30m from the south of the site, within Five Fords Water Treatment Works and there are records returned for Japanese

knotweed, and Himalayan balsam within 2km of the Site, primarily located to the west of the Site.

3.2.42 Himalayan balsam is considered to be potentially present within the site boundary. Japanese knotweed is considered to be present within close proximity to the site.

## 3.3 Summary of Baseline Conditions

3.3.1 The ecological receptors that have been identified on Site from the baseline surveys will be individually assessed against the specific criteria given in the methodology section.

3.3.2 Table 3.3.1 summarises the Baseline Conditions and the value of each receptor within the potential Zone of Influence of the Proposed Development.

**Table 3.3.1 Summary of Baseline Conditions and Receptor Value**

| Ecological Receptor | Within Site Boundary | Within Zone of Influence | Scale of Importance |
|---|---|---|---|
| International/European Statutory Designated Sites | No | No | European |
| National Statutory Designated Sites | No | No | National |
| Non-statutory Designated Sites | No | No | County |
| Other Sites | None Present | | |
| Priority Habitats | No | No | Local |
| Invertebrate Assemblage | No | No | Site |
| Great Crested Newts | Yes | Yes | Local |
| Other Amphibians | Yes | Yes | Site |
| | | | |
| Bats | Yes | Yes | Local |
| Birds | Yes | Yes | Site/Local |
| Reptiles | Yes | Yes | Site |
| Riparian Mammals | No | No | Local |
| Other Priority/Notable Species | Yes | Yes | Local |
| Invasive Non-Native Species | Yes | Yes | Site |

# 4 ASSESSMENT OF EFFECTS AND MITIGATION MEASURES

## 4.1 Introduction and General Approach

4.1.1 This section considers the direct and indirect effects of the Proposed Development on ecological receptors. For each receptor included in the assessment, the likely significant effects are identified, and appropriate mitigation described. Where no significant effect is likely this is stated and justified.

4.1.2 The construction and operational phases of the Site has taken into account the requirement to mitigate against any effects of any of the Proposed Development as far as possible – aiming to avoid them in the first instance ('Primary mitigation') and, if this is not possible, to minimise the adverse effects ('Secondary mitigation') and then off-setting/compensating for any residual effects during the operational period, with opportunities to provide enhancement prior to development or at the point of restoration.

4.1.3 When considering the mitigation for the likely loss of ecological value present within the Site, local and national policies and legislation have been considered

## 4.2 Consideration of Climate Change Effects

4.2.1 The baseline surveys identified that, in general, the majority of species and habitats at the Site are common and widespread within the region. The species and habitats are not isolated within the landscape or at the edge of their range or threatened to a level where climate change may act on their wider population status/distribution. In order to allow those habitats and species to adapt to the demands of climate change in the future, the following principles have been incorporated within mitigation and enhancement measures:

- Building resilience; the use of green infrastructure to create or maintain ecological networks throughout the landscape, and
- Accommodating change; allowing species to benefit from improved connectivity of semi-natural habitats.

4.2.2 The following is a list of proposed achievable targets used in the design of the Proposed Development in respect of mitigation, restoration and enhancement:

- No net loss in biodiversity;
- Positive improvement of retained habitats;
- Maintain (in the short term) and enhance (in the longer term) any local wildlife corridors and other Green Infrastructure; and
- Use opportunities on-site to restore habitats where possible.

4.2.3 A summary table is provided, identifying any residual effects of the project as a whole and mitigation measures required. Cumulative effects are also considered.

## 4.3 Designated Sites

4.3.1 There are two Local Wildlife Sites located within 1km of the site, Marchwiel March and Cefn Park. There are no potential effects as a result of the Proposed Development anticipated on these sites as there is no effect pathway identified due to the lack of connectivity and the distance between the site and these sites.

## 4.4 Priority Habitats

4.4.1 The Proposed Development will certainly not result in the loss of any UK Priority Habitats as none are found within the site boundary.

## 4.5 Great Crested Newts

Construction Phase

4.5.1 The impact assessment in relation to GCN is also relevant to all species of amphibian. Prior to mitigation, it is probable that the Proposed Development will result in a low magnitude impact to GCN at the local scale due to permanent (0.7ha) and temporary (~12ha, c. 12 – 16 weeks) loss of low value terrestrial habitat and disturbance during the construction phase. It is probable that there will also be a medium magnitude impact as a result of injury, harm or killing GCN during construction activities.

4.5.2 Mitigation will comprise appropriate timing of works (outside of the hibernation period), the use of exclusion fencing, a period of pitfall trapping and the translocation of GCN under a European Protected Species License. Habitat creation and enhancements will also be undertaken in line with GCN Mitigation Strategy and managed for the duration of the solar park (anticipated 40 years), according to a Habitat Management Plan.

4.5.3 When considering the mitigation above the residual impacts of the Proposed Development on the local meta-population of GCN are considered to be **Positive (Significant**) at the local scale.

Operational Phase

4.5.4 Prior to mitigation, it is unlikely that the Proposed Development will result in a low magnitude impact as a result of injury, harm or killing GCN during operational activities, comprising site maintenance activities.

4.5.5 Mitigation will comprise creating vehicular speed restrictions on site and adhering to measures within GCN Mitigation License, including habitat management works to deter GCN from entering any high risk maintenance areas.

4.5.6 When considering the mitigation above the residual impacts of the Proposed Development on the local meta-population of GCN are considered to be **Neutral (Not Significant**) at the local scale.

## 4.6 [redacted]

[redacted]

4.6.2 [redacted]

[redacted]

4.6.3 [redacted]

Operational Phase

4.6.4 [redacted]

4.6.5 [redacted]

4.6.6 [redacted]

## 4.7 Bats

Construction Phase

4.7.1 Prior to mitigation, it is probable that the Proposed Development will result in a low magnitude impact to foraging/commuting bats at the local scale due to permanent (0.7ha) habitat loss during the construction phase. It is possible that there will also be a medium magnitude impact as a result of damage to trees with the potential to support bats and a low magnitude impact as a result of temporary disturbance of bats from light and noise during the construction phase.

4.7.2 Mitigation will comprise appropriate timing of works (outside of the hibernation period), demarcation of the root protection zone around all trees with bat roost potential, no working outside of daylight hours and no use of artificial lighting during construction operations. Habitat creation and enhancements will also be undertaken and managed for the duration of the solar park (anticipated 40 years), according to a Habitat Management Plan.

4.7.3 When considering the mitigation above, the residual impacts on the Proposed Development's permanent loss of habitat on the local population of bats is considered to be **Neutral (Not Significant**) and the residual impacts on damage to trees and the temporary disturbance impacts are **Neutral (Not Significant**) at the local scale.

Operational Phase

4.7.4 Prior to mitigation, it is unlikely that the Proposed Development will result in a low magnitude impact as a result of injury, harm or killing bats or as a result of disruption to foraging during

operational activities due to the presence of solar panels. It is unlikely that there will also be a high magnitude impact as a result of disturbance to bats from nocturnal security lighting during operational activities.

4.7.5 Mitigation will comprise installation of a motion-sensor activated lighting scheme, newly created/enhanced boundary habitats and a Habitat Management Plan detailing procedures for when working on trees with the potential to support bats and how to maximize biodiversity gains from management.

4.7.6 When considering the mitigation above the residual impacts of the Proposed Development on the local population of bats are considered to be **Neutral (Not Significant**) at the local scale.

## 4.8 Birds

Construction Phase

4.8.1 Prior to mitigation, it is certain that the Proposed Development will result in a low magnitude impact to birds at the site and local scale due to permanent (0.7ha) and temporary (12ha, c 12 – 16 weeks) loss of habitat, and disturbance during the construction phase. It is probable that there will also be a medium magnitude impact as a result of injury, harm or killing birds during construction activities.

4.8.2 Mitigation will comprise appropriate timing of works (outside of the nesting season) and where this is not possible an Ecological Clerk of Works will undertake a pre-commencement nesting bird check whereby works will not start if active nests are found within the working area. Habitat creation and enhancements will also be undertaken and managed for the duration of the solar park (anticipated 40 years), according to a Habitat Management Plan.

4.8.3 When considering the mitigation above, the residual impacts of permanent habitat loss from the Proposed Development on the local bird population are considered to be **Neutral (Not Significant**), on temporary habitat loss the residual impacts are considered to be **Positive (Not Significant)** and the residual impacts as a result of injury, harm or killing birds are **Neutral (Not Significant**) at the site/local scale.

Operational Phase

4.8.4 Prior to mitigation, it is probable that the Proposed Development will result in a medium magnitude impact to birds as a result of disturbance, injury, harm or killing birds during operational activities, comprising site maintenance.

4.8.5 Mitigation will comprise appropriate timing of works (outside of the nesting season). Habitat creation and enhancements will be implemented through management for the duration of the solar park (anticipated 40 years), according to a Habitat Management Plan.

4.8.6 When considering the mitigation above, the residual impacts of disturbance, injury, harm or killing on the local bird population are considered to be **Neutral Not (Significant**) at the site/local scale.

## 4.9 Reptiles

Construction Phase

4.9.1 Prior to mitigation, it is unlikely that the Proposed Development will result in a low magnitude impact to reptiles at the local scale due to permanent (0.7ha) and temporary (12ha, c. 12 – 16 weeks) loss of habitat and disturbance during the construction phase. It is probable that there will also be a medium magnitude impact as a result of injury, harm or killing during construction activities.

4.9.2 The low risk of harming reptiles and the habitat loses, will be adequately mitigated by the measures that are being proposed to mitigate for impacts to GCN (Paragraph 4.5.2).

4.9.3 When considering the mitigation referred to in relation to GCN, the residual impacts of the Proposed Development on the local population of reptiles are considered to be **Positive (Significant**) at the site scale.

Operational Phase

4.9.4 Prior to mitigation, it is unlikely that the Proposed Development will result in a low magnitude impact as a result of injury, harm or killing reptiles during operational activities, comprising site maintenance.

4.9.5 Mitigation will comprise creating vehicular speed restrictions on site, undertaking works at an appropriate time of the year and adhering to measures within a Habitat Management Plan.

4.9.6 When considering the mitigation above the residual impacts of the Proposed Development on the local population of reptiles are considered to be **Neutral (Not Significant**) at the local scale.

## 4.10 Notable Species

Construction Phase

4.10.1 The impact assessment regarding notable species is relevant to small terrestrial mammals such as brown hare, hedgehog, weasel and polecat. Prior to mitigation, it is unlikely that the Proposed Development will result in a low magnitude impact to terrestrial mammals at the local scale due to permanent (0.7ha) and temporary (12ha, c.12 – 16 weeks) loss of habitat and disturbance during the construction phase. It is unlikely that there will also be a low magnitude impact as a result of injury, harm or killing terrestrial mammals during construction activities, as they are mobile species and can readily disperse away from the site.

4.10.2 Mitigation will comprise habitat creation and enhancements which will then be managed in line with a Habitat Management Plan for the duration of the solar park (anticipated 40 years).

4.10.3 When considering the mitigation above the residual impacts of the Proposed Development on the local population of notable species are considered to be **Positive (Not Significant**) for permanent habitat loss, **Neutral (Not Significant)** for injury killing or harm and **Negative (Not Significant**) for temporary disturbance at the local scale.

Operational Phase

4.10.4 Prior to mitigation, it is unlikely that the Proposed Development will result in a low magnitude impact as a result of injury, harm or killing notable species during operational activities, including site maintenance.

4.10.5 Mitigation will comprise the installation of mammal gates within the perimeter fencing at selected locations to allow use of the main body of the site. There will also be vehicular speed restrictions put in place for maintenance traffic on site, the undertaking works at an appropriate time and adhering to measures within the Habitat Management Plan.

4.10.6 When considering the mitigation above the residual impacts of the Proposed Development on the local population of notable species are considered to be **Neutral (Not Significant**) at the local scale.

## 4.11 Invasive Non-Native Species (INNS)

Construction Phase

4.11.1 Prior to mitigation, it is probable that the Proposed Development will result in a medium magnitude impact at the site scale due to the risk of spreading INNS.

4.11.2 Mitigation will comprise a pre-commencement INNS survey, appropriate timing of works (during the Spring/Summer season) and the creation of a method statement detailing biosecurity arrangements and treatment options. An INNS Management Plan will be created for future control of INNS within the site boundary.

4.11.3 When considering the mitigation above the residual impacts of the Proposed Development on the site are considered to be **Neutral (Not Significant**) at the local scale.

Operational Phase

4.11.4 Prior to mitigation, it is possible that the Proposed Development will result in a low magnitude impact to the site at the site scale due to the risk of spreading INNS during operational/maintenance activities.

4.11.5 Mitigation will comprise appropriate timing of works (during the Spring/Summer season), adherence to an INNS Method Statement and ensuring good practise biosecurity measures.

4.11.6 When considering the mitigation above the residual impacts of the Proposed Development on the site are considered to be **Neutral (Not Significant**) at the local scale.

## 4.12 Summary of Assessment and Mitigation Measures

4.12.1 A summary of the assessment of effects, mitigation measures and residual effects is provided in Table 4.12.1 below. For ease of reference, ecological receptors are only included in the table where an effect has been identified; where no effect is anticipated the receptor has not been included.

**Table 4.12.1 Summary of Ecological Impact Assessment**

| Receptor | Activity | Effect | Scale of Impact | Likelihood | Reversible | Mitigation | Significance of residual effects | Mechanism for securing Mitigation |
|---|---|---|---|---|---|---|---|---|
| **Great crested newt (GCN)** | **Permanent habitat loss from removal of hedgerow, scrub and arable.** | Loss of hibernation, dispersal and foraging habitat. | Low. Only 0.7ha out of 12ha representing <6% of habitat to be lost. | Probable. Due to a known large population of GCN in the area. | No. Habitat enhancements will make up for the loss. | Enhancement and creation of hedgerows, rough grassland, scrub and hibernacula across the Site. Timing of works to avoid terrestrial phase of GCN. Trapping and translocation regime in advance of work starting. | Positive (Significant) | GCN Mitigation Strategy. Trapping & Translocation of GCN from the working area. |
| | **Installation of hard standing for compound and site access roads. Installation of fencing and solar panels.** | Injury, harm or killing of species. | Medium. Mechanical groundbreaking will be undertaken within most areas of the Site. | Probable. Due to a known large population of GCN in the area. | No. | Timing of works to avoid terrestrial phase of GCN. Trapping and translocation regime in advance of work starting. | Neutral (Not Significant). | GCN Mitigation Strategy. Trapping & Translocation of GCN from the working area. |
| | **Temporary loss of habitat/disturbance during construction.** | Temporary loss of hibernation, dispersal and foraging habitat. | Low. The work will be undertaken over a short time period of between 12 – 16 weeks. | Probable. Due to a known large population of GCN in the area. | Yes. Long-term management will revert habitat to an improved condition. | Timing of works to avoid terrestrial phase of GCN. Trapping and translocation regime in advance of work starting. | Positive (Significant). | GCN Mitigation Strategy. Trapping & Translocation of GCN from the working area. |
| **Badger** | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |

| Receptor | Activity | Effect | Scale of Impact | Likelihood | Reversible | Mitigation | Significance of residual effects | Mechanism for securing Mitigation |
|---|---|---|---|---|---|---|---|---|
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| **Bats** | **Permanent habitat loss from removal of hedgerow, scrub and arable.** | Loss of dispersal, commuting and foraging habitat. | Low. Only ~0.7h out of ~12ha representing <6% of habitat, to be lost. | Probable. Bats considered likely to be using the site, but unconfirmed. | No. Habitat enhancements will make up for the loss. | Enhancement and creation of hedgerows, scrub and rough grassland across the Site. Timing of works to avoid active bat season. | Positive (Significant) | Implementation of planning consent – including landscaping scheme. |
| | **Installation of hard standing for site access roads. Installation of fencing and solar panels.** | Risk of long-term damage to trees potentially supporting bats. | Medium. Mechanical groundbreaking will be undertaken adjacent to trees with bat roosts. | Possible. | No. | Demarcate root protection zones around trees with bat roost potential. | Neutral (Not Significant). | Implementation of planning consent. |
| | **Temporary disturbance during construction from light and noise.** | Disturbance of dispersal, commuting and foraging habitat. | Low. The work will be undertaken over a short time period of between 12 – 16 weeks | Possible. | Yes. | No working outside daylight hours and no artificial lighting to be used. | Neutral (Not Significant). | Implementation of planning consent. |

| Receptor | Activity | Effect | Scale of Impact | Likelihood | Reversible | Mitigation | Significance of residual effects | Mechanism for securing Mitigation |
|---|---|---|---|---|---|---|---|---|
| **Birds** | **Permanent habitat loss from removal of hedgerow and scrub.** | Loss of foraging and nesting habitat. | Low. Just 7m out of 1200m of hedgerow will be lost (0.5%). | Certain. | No. Habitat enhancements will make up for the loss. | Enhancement and creation of hedgerows, scrub and rough grassland across the Site. | Positive (Not Significant). | Implementation of planning conditions. |
| | **Installation of hard standing for compound and site access roads. Installation of fencing and solar panels.** | Injury, harm or killing of nesting birds. | Medium. | Probable. This is an area of highly suitable nesting habitat. | No. | Timing of works to avoid the bird nesting season. | Neutral (Not Significant). | Work to be undertaken outside the nesting bird season (March – August).<br><br>ECoW to undertake nesting bird checks for work undertaken at any other time. |
| | **Temporary loss of habitat/disturbance during construction** | Loss of nesting and foraging habitat. | Low. The work will be undertaken over a short time period of 12-16 weeks. | Probable. This is an area of highly suitable nesting habitat and an area of known nesting birds. | Yes. Long-term management will revert habitat to an improved condition. | Timing of works to avoid the bird nesting season wherever possible. | Negative (Not Significant). | Implementing planning conditions. |
| **Reptiles** | **Permanent habitat loss from removal of hedgerow, scrub and arable.** | Loss of hibernation, dispersal and foraging habitat. | Low. Only 0.7ha out of 12ha representing <6% of habitat to be lost. | Certain. | No. Habitat enhancements will make up for the loss. | Enhancement and creation of hedgerows, scrub, rough grassland and hibernacula across the Site. Timing of works during March – October when species are most active. GCN trapping will also allow safe capture and translocation of reptiles. | Positive (Significant). | GCN Mitigation Strategy.<br><br>Trapping & Translocation of GCN and reptiles from the working area. |
| | **Installation of hard standing for compound and site access roads. Installation of fencing and solar panels.** | Injury, harm or killing of species. | Medium. Mechanical groundbreaking will be undertaken within most areas of the Site. | Unlikely. | No. | Timing of works during March – October when species are most active. GCN trapping will also allow safe capture and translocation of reptiles. | Neutral (Not Significant). | GCN Mitigation Strategy.<br><br>Trapping & Translocation of GCN and reptiles from the working area. |

| Receptor | Activity | Effect | Scale of Impact | Likelihood | Reversible | Mitigation | Significance of residual effects | Mechanism for securing Mitigation |
|---|---|---|---|---|---|---|---|---|
| | **Temporary loss of habitat/disturbance during construction.** | Loss of hibernation, dispersal and foraging habitat. | Low. The work will be undertaken over a short time period of between 12 – 16 weeks. | Unlikely. | Yes. Long-term management will revert habitat to an improved condition. | Timing of works during March – October when species are most active.<br><br>Trapping and translocation regime in advance of work starting. | Positive (Significant). | Implementation of planning consent – including landscaping scheme. |
| **Notable Species** | **Permanent habitat loss from removal of hedgerow, scrub and arable.** | Loss of hibernation, dispersal and foraging habitat. | Low. Only ~0.7ha out of ~12ha representing <6% of habitat to be lost. | Unlikely. These are mobile species which are likely to naturally disperse. | No. | Enhancement and creation of hedgerows and scrub. Creation of rough grassland across the whole site through management.<br><br>Install mammal gates to allow access to grassland beneath panels. | Positive (Not Significant) | Implementation of planning consent – including landscaping scheme. [redacted] |
| | **Installation of hard standing for compound and site access roads. Installation of fencing and solar panels.** | Injury, harm or killing of species. | Low. Mechanical groundbreaking will be undertaken within most areas of the Site. | Unlikely. These are mobile species which are likely to naturally disperse. | No. | GCN mitigation is likely to have cleared the site of all other terrestrial species prior to start of construction. | Neutral (Not Significant) | GCN Mitigation Strategy.<br><br>Trapping & Translocation of protected species from the working area. |
| | **Temporary loss of habitat/disturbance during construction.** | Loss of hibernation, dispersal and foraging habitat. | Low. The work will be undertaken over a short time period of between 12 – 16 weeks. | Probable. Species considered likely to be present, but not confirmed. | Yes. Long-term management will revert habitat to an improved condition. | Habitat enhancement and management post-construction. | Negative (Not Significant) | Implementation of planning consent – including landscaping scheme and Habitat Management Plan. |
| **Site/INNS** | **Breaking ground for general construction activities.** | Risk of spreading INNS on and off site. | Medium. Mechanical groundbreaking will be undertaken. | Probable. Known presence of INNS within the Site and adjacent land. | Yes. | Pre-commencement INNS survey.<br><br>INNS Method Statement to include biosecurity arrangements, timing of works and control/eradication measures. | Neutral (Not Significant). | INNS Method Statement secured by planning condition. |

# 5 RESIDUAL AND CUMULATIVE EFFECTS

## 5.1 Residual Effects of Proposed Development

5.1.1 The measures proposed above represent the best-known working methods to mitigate the anticipated negative effects during the construction and operational phases. All of the remaining residual negative impacts are assessed as being 'Not Significant':

- Loss of dispersal and foraging habitat (badger) – short term and reversible.
- Loss of nesting and foraging habitat (birds) - short term and reversible.
- Loss of hibernation, dispersal and foraging habitat (notable species) - short term and reversible.

## 5.2 Cumulative Effects

5.2.1 Five Fords Water Treatment and Tension Control Bolts Ltd located ~306 to the southwest and ~525, to the northeast respectively are neighbouring sites where recent planning applications have been granted. Five Fords received consent (P/2021/0628) in 2021 to erect a building to contain plant and machinery within an area of existing operational site hardstanding, which had no impacts to ecology. Tension Control Bolts received planning consent (P2021/0248) in 2019, to extend existing buildings with additional parking, service yard and hard landscaping. An ecology report was prepared, identifying the main constraints to be the presence of GCN. A scheme of Reasonable Avoidance Measures was put in place to adequately mitigate the risks posed to the species.

5.2.2 In summary, there are no residual adverse impacts on ecology from any nearby developments which could contribute to the residual impacts identified herein, to produce a significant 'in combination' adverse ecological impact.

# 6 COMPENSATION, ENHANCEMENT AND MONITORING

6.1 The Proposed Scheme has incorporated the following habitat enhancements which will be managed and monitored in line with a GCN Mitigation Strategy and a Habitat Management Plan:

- Woodland planting along northern edge of Cefn Road and to the west of Compartment 1.
- Scrub planting to the south of Cefn Road.
- Hedgerow enhancement planting / gapping-up along the eastern edge of Compartment 2.
- Creation of two hibernacula (to the specification given in the GCN Mitigation Guidelines).
- Creation of a new wildlife/GCN pond in Compartment 2.
- Long-term management of all grassland within the site boundary, for nature conservation value.

6.2 Full details of these habitat enhancement measures are provided in the GCN Mitigation Strategy and details of long-term habitat management of the site are to be included in a Habitat Management Plan (HMP). Long-term monitoring of the site will be included within the HMP, comprising regular assessments of the condition of habitats retained and managed on site.

# 7 CONCLUSIONS

7.1 The Site has been subject to a suite of ecological surveys to inform a full ecological appraisal and impact assessment. The appraisal comprised an Extended Phase 1 Habitat survey, breeding bird surveys and a thorough desk study for the site and surrounding land. The Proposed Development was then assessed as to the likely impacts on the ecological receptors identified.

7.2 The following ecological receptors of potential value were identified:

- GCN and other amphibians
- Badger
- Roosting/foraging/commuting bats
- Nesting birds
- Reptiles
- Notable Species of fauna
- INNS

7.3 The Proposed Development is for a new solar farm, to be sited on two large arable fields. The development will result in solar panels mounted across both of the arable fields, with new access created off Cefn Road, battery storage, security fencing and a temporary compound. There will also be various landscape elements including woodland and scrub planting and the gapping-up of an existing hedgerow. The proposals will result in the permanent loss of 0.7ha of semi-natural habitat loss, primarily arable and a small section of hedgerow, from the installation of new permanent infrastructure.

7.4 The scheme poses potential direct and indirect impacts on all of the receptors identified above, including permanent habitat loss, temporary habitat loss and a risk of harm/injury/disturbance. These impacts are primarily during the construction phase. Mitigation measures include seasonal timing to avoid impacts, a GCN Mitigation Strategy to trap and translocate GCN (and any reptiles) from the working area, [redacted] and a long-term habitat management plan for the site which will convert the existing arable land to rough grassland.

7.5 Following the consideration of mitigation measures, none of the anticipated impacts are assessed to result in any significant residual effects. There are no new or recent planning applications in close proximity to the site with the potential for in-combination / cumulative impacts which could create significant residual adverse impacts from the proposed scheme.

7.6 In summary there are a number of anticipated ecological impacts arising from the proposed solar park at Cefn Farm. However, following the implementation of mitigation measures, there are only a small number of residual negative impacts, none of which are assessed to be significant. Ecological enhancements and long-term site management is predicted to result in a biodiversity net-gain.

# Appendix A - Figures

Proposed Development Layout

Phase 1 Habitat Map

Breeding Bird Survey Maps

Badger Map

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Key:

- Application Area
- Existing Scrub
- Existing Vegetation
- Visibility Splay
- Proposed temporary compound area
- Water Main & Easement
- PROW
- Internal roads / hard standing
- Soil bund
- Hedgerow to be removed
- Hedgerow to be cut to 0.6 m
- Proposed hedgerow
- Hedgerow to be gapped up
- Transformer
- Proposed woodland planting
- Proposed scrub planting
- PV fence line
- CCTV
- Root protection zone

| rev. | date | details | |
|---|---|---|---|
| E | 08-04-22 | (JJ) | Amendment to title |
| D | 28-09-21 | (JLB) | Ecological enhancements added |
| C | 24-09-21 | (JLB) | Entrance bund removed |
| B | 22-09-21 | (JLB) | landscape scheme & red line updated |
| A | 22-08-21 | (JLB) | landscape scheme updated |

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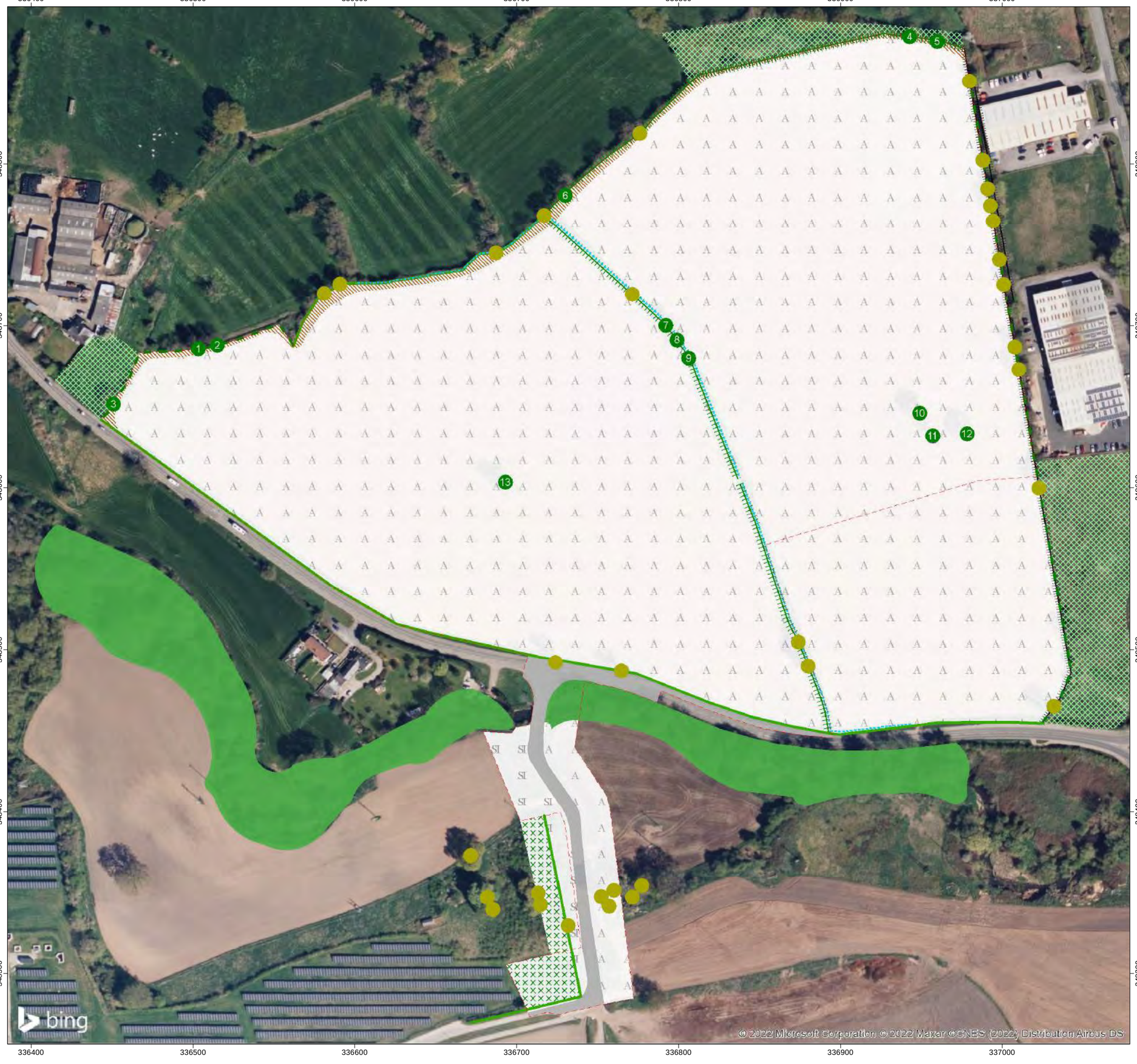
client: Novus RS

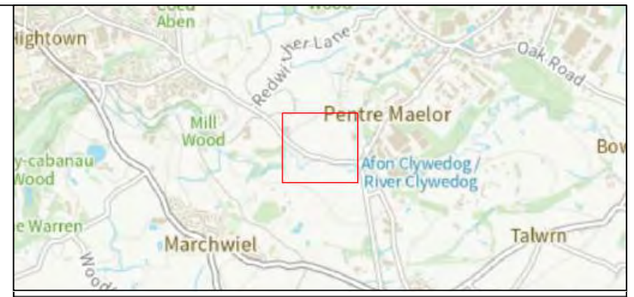
project: Cefn Park

title: Stage 3: Detail Layout

| scale | date | drawn by | checked by | size |
|---|---|---|---|---|
| 1:2500 | 16/08/21 | JLB | | A3 |

| Project ref | dwg no | rev |
|---|---|---|
| CE/321 | CE/321/4 | E |




| Survey Information | |
|---|---|
| | Site boundary (14.52ha) |
| **Phase 1 Habitat Survey** | |
| | Semi-natural broadleaved woodland |
| | Dense / continuous scrub |
| | Scattered scrub |
| SI | Poor semi-improved grassland |
| | Tall ruderal |
| A | Arable |
| | Hardstanding |
| | Species poor hedgerow |
| | Species poor hedgerow defunct |
| | Species poor hedgerow with trees |
| | Dry ditch |
| | Fence |
| | Scattered broadleaved tree with Bat Roost Potential |
| | Scattered broadleaved tree |

Source:
Ordnance Survey © Crown copyright 2022, All rights reserved. Licence Number 100049837.

N

0 10 20 40 60 80
Metres

PROJECT TITLE

*CEFN FARM*

DRAWING TITLE

**Figure 2: Phase 1 Habitat Map**

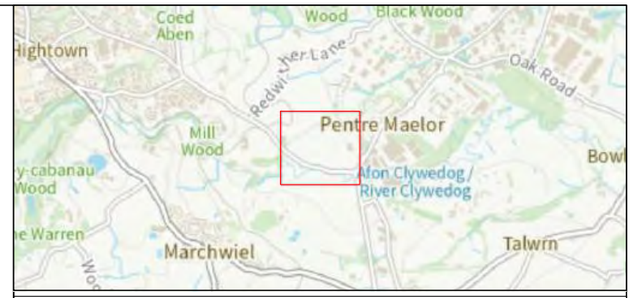
| VER | DATE | REMARKS | Drawn | Checked |
|---|---|---|---|---|
| 1.6 | 13/04/22 | Habitat Map | MP | WO |

DRAWING NUMBER:

ETIVEECOLOGY/CefnFarm/Phase1

| SCALE | 1:2,300 | PLOT SIZE | A3 | DATUM | OSGB | PROJECTION | BNG |
|---|---|---|---|---|---|---|---|

ETIVE ECOLOGY Ltd
www.etiveecology.co.uk T 07825291827 T 07824394564


## Survey Information

| | |
|---|---|
| | Site boundary (14.52ha) |

## BBS Results

| | |
|---|---|
| x | Bird sighting |
| x | Bird calling |
| (x) | Bird singing |
| x | Bird - alarm call |
| x | Bird - occupied nest |

**Additional Information**
Letter codes within each circle refer to the corresponding BTO reference code and coloured according to their status:

Red Status = Red, Amber Status = Amber, Green/No Status = Green

Where more than one bird is observed then the size of the flock is indicated in red text alongside the record.

**Red listed species**
HS - House Sparrow
ST - Song Thrush
Y. - Yellowhammer

**Amber listed species**
BF - Bullfinch
D. - Dunnock
HM - House Martin

**Green listed species**
B. - Blackbird
BC - Blackcap
BT - Blue Tit
BZ - Buzzard
C. - Carrion Crow
CC - Chiffchaff
CH - Chaffinch
CT - Coal Tit
GO - Goldfinch
GR - Greenfinch
GT - Great Tit
JD - Jackdaw
LT - Long-tailed Tit
MG - Magpie
PW - Pied Wagtail
R. - Robin
SL - Swallow
WH - Whitethroat
WP - Wood Pigeon



N

0 10 20 40 60 80
Metres

PROJECT TITLE

*CEFN FARM*

DRAWING TITLE

**Figure 3.1: Breeding Bird Survey, April - Survey 1**

| VER | DATE | REMARKS | Drawn | Checked |
|---|---|---|---|---|
| 1.2 | 13/04/22 | BBS Visit 1 | MP | WO |

DRAWING NUMBER:

ETIVEECOLOGY/CefnFarm/BBSV1

| SCALE | 1:2,500 | PLOT SIZE | A3 | DATUM | OSGB | PROJECTION | BNG |
|---|---|---|---|---|---|---|---|

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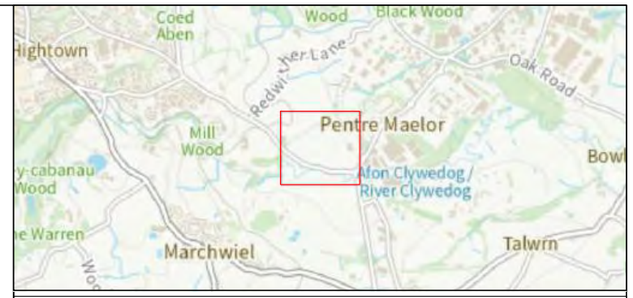


| Survey Information | |
|---|---|
| | Site boundary (14.52ha) |

| BBS Results | |
|---|---|
| x | Bird sighting |
| x | Bird calling |
| (x) | Bird singing |
| x | Bird - alarm call |
| x | Bird - occupied nest |

**Additional Information**
Letter codes within each circle refer to the corresponding BTO reference code and coloured according to their status:

Red Status = Red, Amber Status = Amber, Green/No Status = Green

Where more than one bird is observed then the size of the flock is indicated in red text alongside the record.

**Red listed species**
HS - House Sparrow
ST - Song Thrush
Y. - Yellowhammer

**Amber listed species**
BF - Bullfinch
D. - Dunnock
HM - House Martin

**Green listed species**
B. - Blackbird
BC - Blackcap
BT - Blue Tit
BZ - Buzzard
C. - Carrion Crow
CC - Chiffchaff
CH - Chaffinch
CT - Coal Tit
GO - Goldfinch
GR - Greenfinch
GT - Great Tit
JD - Jackdaw
LT - Long-tailed Tit
MG - Magpie
PW - Pied Wagtail
R. - Robin
SL - Swallow
WH - Whitethroat
WP - Wood Pigeon



N

0 10 20 40 60 80
Metres

PROJECT TITLE

*CEFN FARM*

DRAWING TITLE

## Figure 3.2: Breeding Bird Survey, May - Survey 2

| VER | DATE | REMARKS | Drawn | Checked |
|---|---|---|---|---|
| 1.2 | 13/04/22 | BBS Visit 2 | MP | WO |

DRAWING NUMBER:
ETIVEECOLOGY/CefnFarm/BBSV2

| SCALE | 1:2,500 | PLOT SIZE | A3 | DATUM | OSGB | PROJECTION | BNG |
|---|---|---|---|---|---|---|---|

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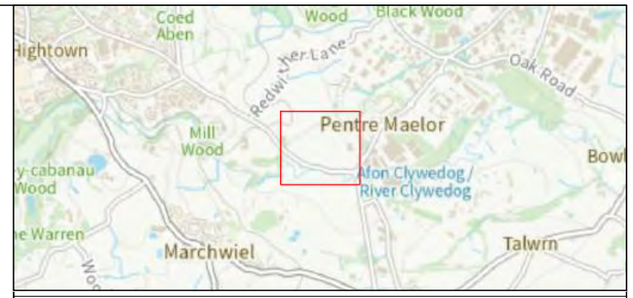


| Survey Information | |
|---|---|
| | Site boundary (14.52ha) |

| BBS Results | |
|---|---|
| x | Bird sighting |
| x | Bird calling |
| (x) | Bird singing |
| x | Bird - alarm call |
| x | Bird - occupied nest |

**Additional Information**
Letter codes within each circle refer to the corresponding BTO reference code and coloured according to their status:

Red Status = Red, Amber Status = Amber, Green/No Status = Green

Where more than one bird is observed then the size of the flock is indicated in red text alongside the record.

**Red listed species**
HS - House Sparrow
ST - Song Thrush
Y. - Yellowhammer

**Amber listed species**
BF - Bullfinch
D. - Dunnock
HM - House Martin

**Green listed species**
B. - Blackbird
BC - Blackcap
BT - Blue Tit
BZ - Buzzard
C. - Carrion Crow
CC - Chiffchaff
CH - Chaffinch
CT - Coal Tit
GO - Goldfinch
GR - Greenfinch
GT - Great Tit
JD - Jackdaw
LT - Long-tailed Tit
MG - Magpie
PW - Pied Wagtail
R. - Robin
SL - Swallow
WH - Whitethroat
WP - Wood Pigeon



N

0 10 20 40 60 80
Metres

PROJECT TITLE

*CEFN FARM*

DRAWING TITLE

**Figure 3.3: Breeding Bird Survey, June - Survey 3**

| VER | DATE | REMARKS | Drawn | Checked |
|---|---|---|---|---|
| 1.2 | 13/04/22 | BBS Visit 3 | MP | WO |

DRAWING NUMBER:
ETIVEECOLOGY/CefnFarm/BBSV3

| SCALE | 1:2,500 | PLOT SIZE | A3 | DATUM | OSGB | PROJECTION | BNG |
|---|---|---|---|---|---|---|---|

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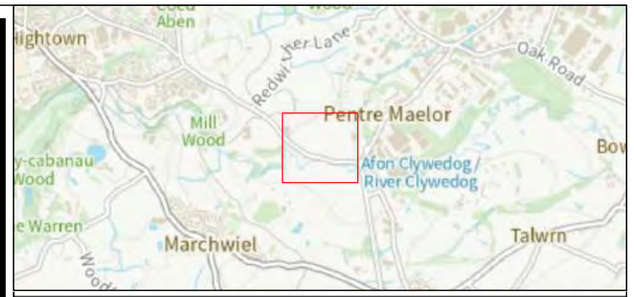


| Survey Information | |
|---|---|
| | Site boundary (14.52ha) |

| Badger Target Notes | |
|---|---|
| | Target note |
| | Broadleaved woodland |
| | Scrub |



N

0 10 20 40 60 80
Metres

PROJECT TITLE

*CEFN FARM*

DRAWING TITLE

## Figure 4: Badger Target Notes

| VER | DATE | REMARKS | Drawn | Checked |
|---|---|---|---|---|
| 1.4 | 13/04/22 | Badgers | MP | WO |

DRAWING NUMBER:

ETIVEECOLOGY/CefnFarm/Badgers

| SCALE | PLOT SIZE | DATUM | PROJECTION |
|---|---|---|---|
| 1:2,300 | A3 | OSGB | BNG |

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## Appendix B - Site Photographs

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Compartment 2 - arable

Southern field boundary with Cefn Road

Three mature oak trees in Compartment 2

Eastern boundary of Compartment 2

Northern boundary of Compartment 2

[redacted]

Compartment 1 – arable with one mature tree

Western corner of Compartment 1

| | |
|---|---|
|  |  |
| Proposed substation location | Proposed scrub planting location |

# Appendix C – Biological Records

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| At Point | Habitat Code | Description | Area (sq.m) | Cover (%) |
|---|---|---|---|---|
| False | A.1.1.1 | Semi-natural Broad-leaved Woodland | 407367 | 2.5 |
| False | A.1.1.2 | Planted Broad-leaved Woodland | 45169 | 0.28 |
| False | A.1.2.2 | Planted Coniferous Woodland | 8368 | 0.05 |
| False | A.1.3.2 | Planted Mixed Woodland | 43989 | 0.27 |
| False | A.2.1 | Dense Scrub | 342383 | 2.1 |
| False | B.2.2 | Semi-improved Neutral Grassland | 299185 | 1.83 |
| True | B.4 | Improved Grassland | 8710789 | 53.38 |
| False | B.5 | Marshy Grassland | 34131 | 0.21 |
| False | C.3.1 | Tall Ruderal Herb | 18191 | 0.11 |
| False | F.1 | Swamp | 300 | 0 |
| False | G.1 | Standing Water | 80355 | 0.49 |
| False | G.2 | Running Water | 69008 | 0.42 |
| False | J.1.1 | Arable | 1737809 | 10.65 |
| False | J.1.2 | Amenity Grassland | 350045 | 2.15 |
| False | J.1.3 | Ephemeral/Short Perennial | 707109 | 4.33 |
| False | J.1.4 | Introduced Scrub | 1513 | 0.01 |
| False | J.1.5 | Gardens | 21090 | 0.13 |
| False | J.3.6 | Buildings | 2780814 | 17.04 |
| False | J.4 | Bare Ground | 33789 | 0.21 |
| False | NA | Not Accessed Land | 56933 | 0.35 |

| Distance (m) | Site Type | Site Name | Site Information |
|---|---|---|---|
| 61 | Ancient Woodland Sites | 33400: Ancient Semi Natural Woodland | |
| 71 | Ancient Woodland Sites | 30636: Restored Ancient Woodland Site | |
| 91 | Ancient Woodland Sites | 33397: Ancient Semi Natural Woodland | |
| 493 | Ancient Woodland Sites | 28949: Ancient Semi Natural Woodland | |
| 523 | Ancient Woodland Sites | 33392: Ancient Semi Natural Woodland | |
| 571 | Listed Buildings | 18058: Pum-Rhyd | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=18058 |
| 595 | Ancient Woodland Sites | 33412: Ancient Semi Natural Woodland | |
| 634 | Ancient Woodland Sites | 33406: Ancient Semi Natural Woodland | |
| 691 | Ancient Woodland Sites | 28952: Ancient Semi Natural Woodland | |
| 751 | Ancient Woodland Sites | 33401: Ancient Semi Natural Woodland | |
| 790 | Wildlife Sites | W338: Marchwiel Marsh | http://safleol.lercwales.org.uk/Public?ID=3160 |
| 817 | Ancient Woodland Sites | 30639: Restored Ancient Woodland Site | |
| 877 | Ancient Woodland Sites | 33407: Ancient Semi Natural Woodland | |
| 887 | Ancient Woodland Sites | 37164: Restored Ancient Woodland Site | |
| 902 | Listed Buildings | 1553: Llwyn Onn Hall Hotel | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=1553 |
| 918 | Wildlife Sites | W316: Cefn Park | http://safleol.lercwales.org.uk/Public?ID=3138 |
| 919 | Ancient Woodland Sites | 28954: Ancient Semi Natural Woodland | |
| 979 | Listed Buildings | 17275: Ice-house to NW of Llwyn Onn Hall Hotel | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=17275 |
| 1113 | Ancient Woodland Sites | 33414: Ancient Semi Natural Woodland | |
| 1118 | Ancient Woodland Sites | 33413: Ancient Semi Natural Woodland | |
| 1131 | Ancient Woodland Sites | 33405: Ancient Semi Natural Woodland | |
| 1165 | Listed Buildings | 1614: Church of SS Marcella and Deiniol | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=1614 |
| 1175 | Listed Buildings | 18062: Parkey Farmhouse | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=18062 |
| 1188 | Listed Buildings | 17272: Pavilion including attached Skittle Alley at Cefn Park | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=17272 |
| 1192 | Listed Buildings | 17849: Churchyard walls, gatepiers, railings and gates to S of Church of SS Marcella and Deiniol | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=17849 |
| 1200 | Ancient Woodland Sites | 37158: Restored Ancient Woodland Site | |
| 1219 | Ancient Woodland Sites | 30643: Ancient Semi Natural Woodland | |
| 1227 | Ancient Woodland Sites | 30644: Ancient Semi Natural Woodland | |
| 1273 | Listed Buildings | 18057: Bedwell Hall | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=18057 |
| 1277 | Listed Buildings | 87687: Milestone | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=87687 |
| 1293 | Listed Buildings | 1551: Cefn Park (including attached stableyard range to N) | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=1551 |
| 1299 | Wildlife Sites | W337: Wrexham Industrial Estate | http://safleol.lercwales.org.uk/Public?ID=3159 |
| 1299 | Ancient Woodland Sites | 30640: Restored Ancient Woodland Site | |
| 1313 | Ancient Woodland Sites | 37166: Restored Ancient Woodland Site | |
| 1453 | Ancient Woodland Sites | 33342: Ancient Semi Natural Woodland | |
| 1526 | Ancient Woodland Sites | 33415: Ancient Semi Natural Woodland | |
| 1526 | Listed Buildings | 17845: Ivydale | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=17845 |
| 1583 | Ancient Woodland Sites | 37157: Restored Ancient Woodland Site | |
| 1605 | Wildlife Sites | W319: Peter's Dingle | http://safleol.lercwales.org.uk/Public?ID=3141 |
| 1613 | Listed Buildings | 1727: Bryn-y-Grog Hall | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=1727 |
| 1674 | Ancient Woodland Sites | 33343: Ancient Semi Natural Woodland | |
| 1751 | Listed Buildings | 1755: The Red Lion Public House | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=1755 |
| 1779 | Ancient Woodland Sites | 30646: Ancient Semi Natural Woodland | |
| 1785 | Listed Buildings | 16475: Kingsmills Bridge over River Gwenfro | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=16475 |
| 1791 | Listed Buildings | 1757: Kingsmills Bridge over River Clywedog | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=1757 |
| 1805 | Listed Buildings | 17273: Cefn Park Lodge | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=17273 |
| 1813 | Listed Buildings | 17274: Gates and gate-piers at Cefn Park Lodge | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=17274 |
| 1833 | Wildlife Sites | W317: Erddig Estate | http://safleol.lercwales.org.uk/Public?ID=3139 |
| 1857 | Ancient Woodland Sites | 37156: Restored Ancient Woodland Site | |
| 1906 | Listed Buildings | 18063: Talwrn House | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=18063 |
| 1918 | Listed Buildings | 84802: Erlas Hall | http://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=en&id=84802 |
| 1974 | Ancient Woodland Sites | 37160: Restored Ancient Woodland Site | |

| Species Group | Scientific Name | English Name | Welsh Name | Earliest Year | Latest Year | Total Records |
|---|---|---|---|---|---|---|
| Bees, Wasps, Ants and Sawflies | Andrena (Poecilandrena) labiata | Red-girdled Mining Bee | | 1991 | 1993 | 3 |
| Bees, Wasps, Ants and Sawflies | Chrysura radians | | | 1995 | 1995 | 1 |
| Bees, Wasps, Ants and Sawflies | Sphecodes crassus | Swollen-thighed Blood Bee | | 1992 | 1992 | 1 |
| Birds | Actitis hypoleucos | Common Sandpiper | Pibydd y Dorlan | 2005 | 2005 | 1 |
| Birds | Aegithalos caudatus | Long-tailed Tit | Titw Cynffon-Hir | 2007 | 2019 | 27 |
| Birds | Aix galericulata | Mandarin Duck | Hwyaden Gribog | 2016 | 2016 | 1 |
| Birds | Alauda arvensis | Skylark | Ehedydd | 2004 | 2012 | 8 |
| Birds | Alcedo atthis | Kingfisher | Glas y Dorlan | 2016 | 2019 | 3 |
| Birds | Anas clypeata | Shoveler | Hwyaden Lydanbig | 2010 | 2010 | 1 |
| Birds | Anas crecca | Teal | Corhwyaden | 2010 | 2010 | 1 |
| Birds | Anas platyrhynchos | Mallard | Hwyaden Wyllt | 2009 | 2019 | 6 |
| Birds | Anthus pratensis | Meadow Pipit | Corhedydd y Waun | 2009 | 2009 | 3 |
| Birds | Apus apus | Swift | Gwennol Ddu | 2006 | 2019 | 12 |
| Birds | Aythya fuligula | Tufted Duck | Hwyaden Gopog | 2009 | 2009 | 2 |
| Birds | Branta canadensis | Canada Goose | Gwydd Canada | 2008 | 2010 | 4 |
| Birds | Bucephala clangula | Goldeneye | Hwyaden Lygad-Aur | 2010 | 2010 | 1 |
| Birds | Cettia cetti | Cetti's Warbler | Telor Cetti | 2017 | 2017 | 1 |
| Birds | Chroicocephalus ridibundus | Black-headed Gull | Gwylan Benddu | 2009 | 2016 | 8 |
| Birds | Cinclus cinclus | Dipper | Bronwen y Dwr | 2010 | 2018 | 3 |
| Birds | Cuculus canorus | Cuckoo | Cog | 2006 | 2013 | 3 |
| Birds | Cygnus olor | Mute Swan | Alarch Dof | 2006 | 2008 | 3 |
| Birds | Delichon urbicum | House Martin | Gwennol y Bondo | 2009 | 2016 | 9 |
| Birds | Emberiza citrinella | Yellowhammer | Bras Melyn | 2002 | 2002 | 1 |
| Birds | Emberiza schoeniclus | Reed Bunting | Bras y Cyrs | 2007 | 2016 | 7 |
| Birds | Falco peregrinus | Peregrine | Hebog Tramor | 2005 | 2010 | 2 |
| Birds | Falco subbuteo | Hobby | Hebog yr Ehedydd | 2009 | 2016 | 2 |
| Birds | Falco tinnunculus | Kestrel | Cudyll Coch | 2008 | 2021 | 13 |
| Birds | Gallinago gallinago | Snipe | Gïach Cyffredin | 2005 | 2015 | 3 |
| Birds | Haematopus ostralegus | Oystercatcher | Pioden Fôr | 2005 | 2005 | 1 |
| Birds | Hirundo rustica | Swallow | Gwennol | 2007 | 2018 | 32 |
| Birds | Larus argentatus | Herring Gull | Gwylan y Penwaig | 2009 | 2017 | 8 |
| Birds | Larus canus | Common Gull | Gwylan y Gweunydd | 2009 | 2010 | 5 |
| Birds | Larus fuscus | Lesser Black-backed Gull | Gwylan Gefnddu Leiaf | 2009 | 2016 | 5 |
| Birds | Larus marinus | Great Black-backed Gull | Gwylan Gefnddu Fwyaf | 2016 | 2016 | 1 |
| Birds | Linaria cannabina | Linnet | Llinos | 2004 | 2011 | 11 |
| Birds | Locustella naevia | Grasshopper Warbler | Troellwr Bach | 2006 | 2011 | 4 |
| Birds | Muscicapa striata | Spotted Flycatcher | Gwybedog Mannog | 2006 | 2014 | 4 |
| Birds | Numenius arquata | Curlew | Gylfinir | 2009 | 2010 | 2 |
| Birds | Oenanthe oenanthe | Wheatear | Tinwen y Garn | 2017 | 2018 | 2 |
| Birds | Passer domesticus | House Sparrow | Aderyn y To | 2004 | 2017 | 39 |
| Birds | Perdix perdix | Grey Partridge | Petrisen | 2005 | 2005 | 1 |
| Birds | Periparus ater | Coal Tit | Titw Penddu | 2009 | 2010 | 15 |
| Birds | Phalacrocorax carbo | Cormorant | Mulfran | 2006 | 2016 | 2 |
| Birds | Phoenicurus phoenicurus | Redstart | Tingoch | 2009 | 2009 | 2 |
| Birds | Phylloscopus trochilus | Willow Warbler | Telor yr Helyg | 2005 | 2011 | 11 |
| Birds | Picus viridis | Green Woodpecker | Cnocell Werdd | 2007 | 2019 | 10 |
| Birds | Poecile montana | Willow Tit | Titw'r Helyg | 2009 | 2009 | 1 |
| Birds | Poecile palustris | Marsh Tit | Titw'r Wern | 2007 | 2019 | 5 |
| Birds | Prunella modularis | Dunnock | Llwyd y Gwrych | 2005 | 2017 | 37 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Birds | Pyrrhula pyrrhula | Bullfinch | Coch y Berllan | 2004 | 2020 | 17 |
| Birds | Regulus regulus | Goldcrest | Dryw Eurben | 2005 | 2016 | 6 |
| Birds | Scolopax rusticola | Woodcock | Cyffylog | 2005 | 2018 | 7 |
| Birds | Sturnus vulgaris | Starling | Drudwen | 2007 | 2017 | 34 |
| Birds | Sylvia communis | Whitethroat | Llwydfron | 2004 | 2019 | 19 |
| Birds | Tadorna tadorna | Shelduck | Hwyaden yr Eithin | 2010 | 2010 | 1 |
| Birds | Tringa ochropus | Green Sandpiper | Pibydd Gwyrdd | 2015 | 2015 | 1 |
| Birds | Turdus iliacus | Redwing | Coch Dan Adain | 2007 | 2017 | 12 |
| Birds | Turdus philomelos | Song Thrush | Bronfraith | 2005 | 2016 | 36 |
| Birds | Turdus pilaris | Fieldfare | Socan Eira | 2007 | 2019 | 10 |
| Birds | Tyto alba | Barn Owl | Tylluan Wen | 2005 | 2020 | 37 |
| Birds | Vanellus vanellus | Lapwing | Cornchwiglen | 2004 | 2017 | 14 |
| Butterflies and Moths | Chiasmia clathrata | Latticed Heath | Seffyr Delltog | 2004 | 2020 | 9 |
| Butterflies and Moths | Chiasmia clathrata clathrata | Latticed Heath | | 2009 | 2009 | 1 |
| Butterflies and Moths | Coenonympha pamphilus | Small Heath | Gweirlöyn Bach y Waun | 1991 | 2021 | 81 |
| Butterflies and Moths | Ecliptopera silaceata | Small Phoenix | Ffenics Bach | 1972 | 1973 | 2 |
| Butterflies and Moths | Erynnis tages | Dingy Skipper | Gwibiwr Llwyd | 1995 | 2021 | 137 |
| Butterflies and Moths | Hemistola chrysoprasaria | Small Emerald | Emrallt Barf yr Hen Wr | 1973 | 1973 | 2 |
| Butterflies and Moths | Hepialus humuli | Ghost Moth | Chwimwyfyn Rhithiol | 2002 | 2002 | 1 |
| Butterflies and Moths | Lasiommata megera | Wall | Gweirlöyn y Cloddiau | 1995 | 2005 | 4 |
| Butterflies and Moths | Pyrgus malvae | Grizzled Skipper | Gwibiwr Brith | 1993 | 2021 | 177 |
| Butterflies and Moths | Satyrium w-album | White-letter Hairstreak | Brithribin W Wen | 2006 | 2006 | 1 |
| Butterflies and Moths | Scotopteryx chenopodiata | Shaded Broad-bar | Rhesen Lydan Dywyll | 2004 | 2016 | 13 |
| Butterflies and Moths | Timandra comae | Blood-vein | Gwyfyn Gwythïen Goch | 2018 | 2018 | 1 |
| Butterflies and Moths | Tyria jacobaeae | Cinnabar | Teigr y Benfelen | 2004 | 2016 | 10 |
| Butterflies and Moths | Watsonalla binaria | Oak Hook-tip | Bachadain y Deri | 1972 | 1973 | 2 |
| Fish | Anguilla anguilla | Eel | Llysywen | 2001 | 2017 | 4 |
| Fish | Cyprinus carpio | Common Carp | Cerpyn | 2019 | 2019 | 2 |
| Fish | Salmo salar | Atlantic Salmon | Eog | 2001 | 2007 | 5 |
| Fish | Salmo trutta | Brown/Sea Trout | Siwin; Brithyll | 2001 | 2007 | 4 |
| Mammals | Arvicola amphibius | Water Vole | Llygoden Bengron y Dwr | 2000 | 2000 | 2 |
| Mammals | Chiroptera | Unknown Bat | Ystlum Anhysbys | 1981 | 2005 | 11 |
| Mammals | Erinaceus europaeus | Hedgehog | Draenog | 2005 | 2021 | 29 |
| Mammals | Lepus europaeus | Hare | Ysgyfarnog | 2006 | 2010 | 2 |
| Mammals | Lutra lutra | Otter | Dyfrgi | 1991 | 2019 | 22 |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| Mammals | Mustela nivalis | Weasel | Gwenci | 2020 | 2021 | 2 |
| Mammals | Mustela putorius | Polecat | Ffwlbart | 2006 | 2013 | 4 |
| Mammals | Myotis | Myotis Bat Species | | 2016 | 2017 | 3 |
| Mammals | Myotis brandtii | Brandt's Bat | Ystlum Brandt | 2016 | 2017 | 3 |
| Mammals | Myotis daubentonii | Daubenton's Bat | Ystlum y Dwr | 2016 | 2016 | 1 |
| Mammals | Myotis mystacinus | Whiskered Bat | Ystlum Barfog | 1998 | 2004 | 4 |
| Mammals | Neovison vison | American Mink | Minc | 2005 | 2011 | 3 |
| Mammals | Nyctalus noctula | Noctule Bat | Ystlum Mawr | 2016 | 2016 | 5 |
| Mammals | Pipistrellus | Pipistrellus Bat Species | | 2003 | 2017 | 4 |
| Mammals | Pipistrellus pipistrellus | Common Pipistrelle | Ystlum Lleiaf Cyffredin | 1981 | 2020 | 16 |
| Mammals | Pipistrellus pipistrellus agg. | Pipistrelle agg. | Ystlum Lleiaf | 1985 | 1985 | 1 |
| Mammals | Pipistrellus pygmaeus | Soprano Pipistrelle | Ystlum Lleiaf Uchelsain | 2013 | 2017 | 9 |
| Mammals | Plecotus auritus | Brown Long-eared Bat | Ystlum Hirglust | 1991 | 2020 | 7 |
| Mammals | Rhinolophus hipposideros | Lesser Horseshoe Bat | Ystlum Pedol Lleiaf | 2005 | 2005 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Other Invertebrates | Acanthiophilus helianthi | | | 2000 | 2000 | 1 |
| Other Invertebrates | Anaglyptus mysticus | | | 1994 | 1994 | 3 |
| Other Invertebrates | Atypophthalmus inustus | | | 1987 | 1987 | 2 |
| Other Invertebrates | Baetis niger | Southern Iron Blue | | 2013 | 2013 | 2 |
| Other Invertebrates | Bembidion obliquum | | | 2008 | 2008 | 1 |
| Other Invertebrates | Bembidion quadripustulatum | Scarce Four-dot Pin-palp | | 2008 | 2008 | 2 |
| Other Invertebrates | Beris fuscipes | Short-horned Black Legionnaire | | 1998 | 1998 | 3 |
| Other Invertebrates | Chalcosyrphus eunotus | | | 1992 | 1994 | 3 |
| Other Invertebrates | Crangonyx pseudogracilis/floridanus | | | 2007 | 2010 | 2 |
| Other Invertebrates | Cyphon pubescens | | | 2000 | 2000 | 2 |
| Other Invertebrates | Dicranomyia lucida | | | 1987 | 1987 | 1 |
| Other Invertebrates | Diplapion stolidum | | | 2000 | 2000 | 1 |
| Other Invertebrates | Donacia thalassina | | | 2012 | 2012 | 1 |
| Other Invertebrates | Dytiscus circumcinctus | | | 2001 | 2001 | 1 |
| Other Invertebrates | Elodes minuta | | | 2000 | 2000 | 1 |
| Other Invertebrates | Gnypeta ripicola | | | 1998 | 1998 | 1 |
| Other Invertebrates | Grypus equiseti | Horsetail Weevil | | 2008 | 2008 | 1 |
| Other Invertebrates | Harmonia axyridis | Harlequin Ladybird | | 2016 | 2016 | 1 |
| Other Invertebrates | Hydaticus seminiger | | | 1999 | 2000 | 7 |
| Other Invertebrates | Hydronomus alismatis | Bagous alismatis | | 2003 | 2003 | 1 |
| Other Invertebrates | Ischnomera caerulea | | | 1993 | 1993 | 2 |
| Other Invertebrates | Limonia trivittata | | | 1987 | 1987 | 1 |
| Other Invertebrates | Lipsothrix nervosa | Southern Yellow Splinter | | 1987 | 1987 | 1 |
| Other Invertebrates | Molophilus corniger | | | 1987 | 1987 | 1 |
| Other Invertebrates | Neophytobius quadrinodosus | | | 2000 | 2000 | 1 |
| Other Invertebrates | Odontomyia tigrina | Black Colonel | | 2000 | 2000 | 1 |
| Other Invertebrates | Pseudorchestes pratensis | | | 2000 | 2000 | 1 |
| Other Invertebrates | Rhyacophila fasciata | | | 1979 | 1979 | 1 |
| Other Invertebrates | Stenus fornicatus | | | 2000 | 2000 | 1 |
| Other Invertebrates | Sympetrum sanguineum | Ruddy Darter | Gwäell Rudd | 2009 | 2009 | 1 |
| Other Invertebrates | Tasiocera robusta | | | 1987 | 1987 | 1 |
| Other Invertebrates | Thaumastoptera calceata | | | 1987 | 1987 | 1 |
| Plants | Calamagrostis epigejos | Wood Small-reed | Corsen Fach y Coed | 2011 | 2011 | 2 |
| Plants | Carex riparia | Greater Pond-sedge | Hesgen-y-Dwr Fawr | 2011 | 2011 | 1 |
| Plants | Cichorium intybus | Chicory | Ysgellog | 2015 | 2015 | 1 |
| Plants | Crassula helmsii | New Zealand Pigmyweed | Corchwyn Seland Newydd | 2014 | 2014 | 1 |
| Plants | Crepis biennis | Rough Hawk's-beard | Gwalchlys Garw | 1998 | 2014 | 8 |
| Plants | Crocosmia pottsii x aurea = C. x crocosmiiflora | Montbretia | Crib-y-Ceiliog | 2011 | 2014 | 2 |
| Plants | Dactylorhiza fuchsii x praetermissa = D. x grandis | Marsh-Orchid | | 2011 | 2016 | 3 |
| Plants | Dactylorhiza praetermissa | Southern Marsh-orchid | Tegeirian-y-Gors Deheuol | 2016 | 2016 | 1 |
| Plants | Elodea canadensis | Canadian Waterweed | Ffugalaw Canada | 2017 | 2017 | 1 |
| Plants | Elodea nuttallii | Nuttall's Waterweed | Ffugalaw Nuttall | 2011 | 2011 | 1 |
| Plants | Fallopia japonica | Japanese Knotweed | Clymog Japan | 2007 | 2016 | 11 |
| Plants | Frangula alnus | Alder Buckthorn | Breuwydden | 2020 | 2020 | 1 |
| Plants | Genista tinctoria | Dyer's Greenweed | Melynog y Waun | 2007 | 2007 | 1 |
| Plants | Heracleum mantegazzianum | Giant Hogweed | Efwr Enfawr | 2011 | 2011 | 1 |
| Plants | Hyacinthoides hispanica | Spanish Bluebell | Clychau'r Gog Sbaenaidd | 2019 | 2019 | 1 |
| Plants | Hyacinthoides non-scripta | Bluebell | Clychau'r Gog | 2020 | 2020 | 1 |
| Plants | Hyacinthoides non-scripta x hispanica = H. x massartiana | Bluebell | Clychau'r Gog Croesryw | 2015 | 2015 | 1 |
| Plants | Impatiens glandulifera | Himalayan Balsam | Jac y Neidiwr | 2006 | 2016 | 15 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Plants | Lathyrus nissolia | Grass Vetchling | Ytbysen Feinddail | 2009 | 2018 | 7 |
| Plants | Lemna minuta | Least Duckweed | Llinad Bach | 2014 | 2015 | 3 |
| Plants | Medicago arabica | Spotted Medick | Maglys Brith | 2016 | 2016 | 1 |
| Plants | Mentha aquatica x spicata = M. x piperita | Peppermint | Mintys Poeth | 2014 | 2014 | 2 |
| Plants | Mentha arvensis | Corn Mint | Mintys yr Âr | 2016 | 2016 | 1 |
| Plants | Narcissus pseudonarcissus subsp. major | Spanish Daffodil | Cenhinen-Bedr Sbaen | 2019 | 2019 | 1 |
| Plants | Ononis spinosa | Spiny Restharrow | Tagaradr Pigog | 2013 | 2016 | 4 |
| Plants | Ophioglossum vulgatum | Adder's-tongue | Tafod y Neidr | 2010 | 2010 | 1 |
| Plants | Petasites hybridus | Butterbur | Alan Mawr | 2010 | 2014 | 6 |
| Plants | Polemonium caeruleum | Jacob's-ladder | Ysgol Jacob | 2011 | 2011 | 1 |
| Plants | Populus nigra | Black-poplar | Poplysen Ddu | 2006 | 2006 | 2 |
| Plants | Potamogeton pusillus | Lesser Pondweed | Dyfrllys Eiddil | 2014 | 2014 | 1 |
| Plants | Prunus laurocerasus | Cherry Laurel | Coeden Lawrgeirios | 2011 | 2011 | 2 |
| Plants | Raphanus raphanistrum | Radish | Rhuddygl | 1988 | 1988 | 1 |
| Plants | Rorippa amphibia | Great Yellow-cress | Berwr Melyn Mawr | 2016 | 2016 | 1 |
| Plants | Rosa canina x caesia = R. x dumalis | Rose | | 2014 | 2014 | 1 |
| Plants | Salix pentandra | Bay Willow | Helygen Bêr | 2014 | 2014 | 1 |
| Plants | Salix viminalis x cinerea = S. x holosericea | Silky-leaved Osier | | 2011 | 2011 | 2 |
| Plants | Sedum album | White Stonecrop | Briweg Wen | 2011 | 2020 | 5 |
| Plants | Silaum silaus | Pepper-saxifrage | Ffenigl yr Hwch | 2009 | 2014 | 6 |
| Plants | Sinapis arvensis | Charlock | Mwstard Gwyllt | 2011 | 2014 | 2 |
| Reptiles and Amphibians | Anguis fragilis | Slow-worm | Neidr Ddefaid | 1999 | 2009 | 3 |
| Reptiles and Amphibians | Bufo bufo | Common Toad | Llyffant Dafadennog | 1984 | 2021 | 41 |
| Reptiles and Amphibians | Lissotriton | | | 1992 | 2021 | 93 |
| Reptiles and Amphibians | Lissotriton helveticus | Palmate Newt | Madfall Ddwr Balfog | 2015 | 2021 | 12 |
| Reptiles and Amphibians | Lissotriton vulgaris | Smooth Newt | Madfall Ddwr Gyffredin | 1984 | 2021 | 324 |
| Reptiles and Amphibians | Natrix helvetica | Grass Snake | Neidr y Gwair | 1990 | 2018 | 5 |
| Reptiles and Amphibians | Rana temporaria | Common Frog | Llyffant Melyn | 1984 | 2021 | 76 |
| Reptiles and Amphibians | Triturus cristatus | Great Crested Newt | Madfall Ddwr Gribog | 1976 | 2021 | 800 |
| Reptiles and Amphibians | Vipera berus | Adder | Gwiber | 1999 | 2009 | 3 |
| Reptiles and Amphibians | Zootoca vivipara | Common Lizard | Madfall | 2020 | 2020 | 1 |

# Appendix D – eDNA Analysis Results

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SureScreen Scientifics

Folio No: E8099
Report No: 1
Purchase Order: PO00812
Client: ETIVE ECOLOGY
Contact: Russell Grey

# TECHNICAL REPORT

## ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS (TRITURUS CRISTATUS)

### SUMMARY

When great crested newts (GCN), *Triturus cristatus*, inhabit a pond, they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm GCN habitation or establish GCN absence.

### RESULTS

**Date sample received at Laboratory:** 29/06/2020
**Date Reported:** 07/07/2020
**Matters Affecting Results:** None

| Lab Sample No. | Site Name | O/S Reference | SIC | DC | IC | Result | Positive Replicates |
|---|---|---|---|---|---|---|---|
| 4550 | Pond 8, Land West of Wie | SJ 3662 4951 | Pass | Pass | Pass | Negative | 0 |
| 4551 | Pond 5, Land West of Wie | SJ 3687 4902 | Pass | Pass | Pass | Negative | 0 |
| 4552 | Pond 4, Land West of Wie | SJ 3659 4894 | Pass | Pass | Pass | Negative | 0 |
| 4553 | Pond 6, Land West of Wie | SJ 3660 4913 | Pass | Pass | Pass | Negative | 0 |
| 4554 | Pond 7, Land West of Wie | SJ 3684 4926 | Pass | Pass | Pass | Positive | 1 |

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

**Reported by:** Sarah Evans **Approved by:** Chris Troth

## METHODOLOGY

The samples detailed above have been analysed for the presence of GCN eDNA following the protocol stated in DEFRA WC1067 'Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5.' (Biggs et al. 2014). Each of the 6 sub-sample tubes are first centrifuged and pooled together into a single sample which then undergoes DNA extraction. The extracted sample is then analysed using real time PCR (qPCR), which uses species-specific molecular markers to amplify GCN DNA within a sample. These markers are unique to GCN DNA, meaning that there should be no detection of closely related species.

If GCN DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If GCN DNA is not present then amplification does not occur, and a negative result is recorded.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. True positive controls, negative controls and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared and reported. Stages of the DNA analysis are also conducted in different buildings at our premises for added security.

SureScreen Scientifics Ltd is ISO9001 accredited and participate in Natural England's proficiency testing scheme for GCN eDNA testing. We also carry out regular inter-laboratory checks on accuracy of results as part of our quality control procedures.

## INTERPRETATION OF RESULTS

**SIC:** **Sample Integrity Check** [Pass/Fail]
When samples are received in the laboratory, they are inspected for any tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to inconclusive results.

**DC:** **Degradation Check** [Pass/Fail]
Analysis of the spiked DNA marker to see if there has been degradation of the kit or sample between the date it was made to the date of analysis. Degradation of the spiked DNA marker may lead indicate a risk of false negative results.

**IC:** **Inhibition Check** [Pass/Fail]
The presence of inhibitors within a sample are assessed using a DNA marker. If inhibition is detected, samples are purified and re-analysed. Inhibitors cannot always be removed, if the inhibition check fails, the sample should be re-collected.

**Result:** **Presence of GCN eDNA** [Positive/Negative/Inconclusive]
**Positive:** GCN DNA was identified within the sample, indicative of GCN presence within the sampling location at the time the sample was taken or within the recent past at the sampling location.
**Positive Replicates:** Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for GCN presence. It may be assumed that small fractions of positive analyses suggest low level presence, but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive. 0/12 indicates negative GCN presence.
**Negative:** GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of GCN absence, however, does not exclude the potential for GCN presence below the limit of detection.